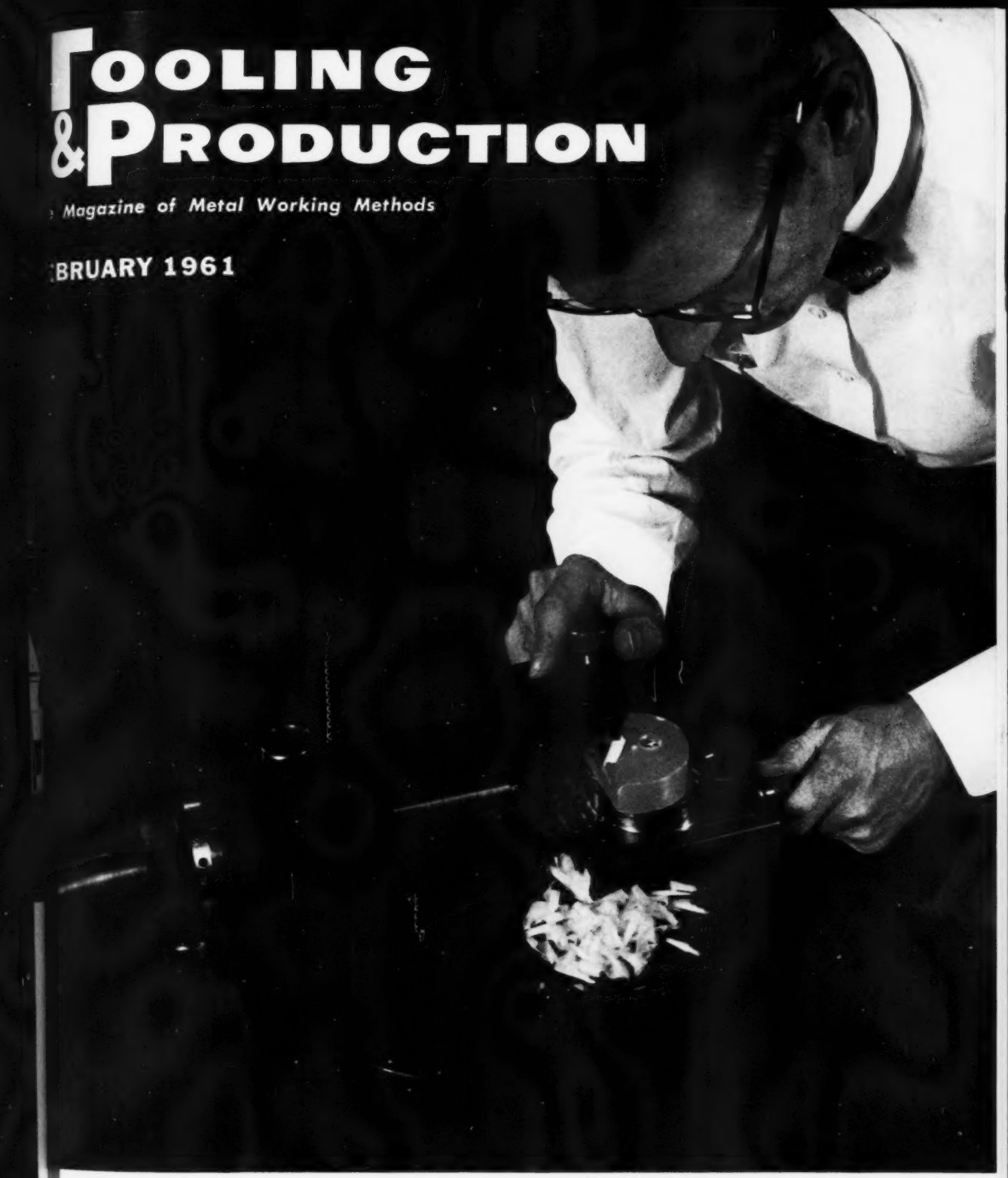
TOOLING & PRODUCTION

Magazine of Metal Working Methods

BRUARY 1961

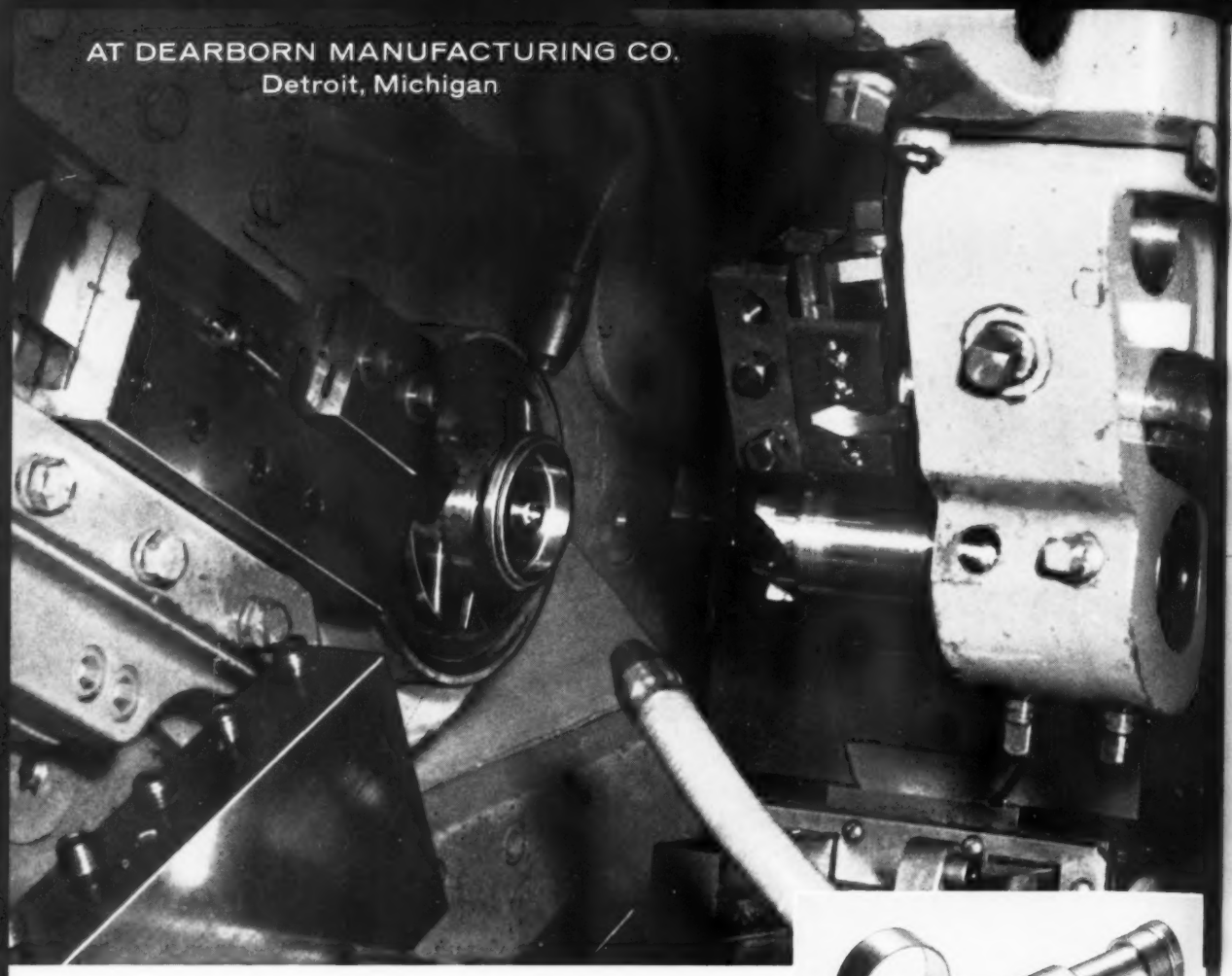


Verified Chips From Unique Fixture . . . page 50

Are We Getting The Most Out Of Our Carbides? . . . page 39
Job Shop Specializes In Tape Control . . . page 43
Make It For Less, And Better, From Tubing . . . page 52

Complete Table of Contents
. . . Inside Cover

AT DEARBORN MANUFACTURING CO.
Detroit, Michigan



Precision blanking to .001 tolerances eliminates many secondary operations

Precision blanking of stainless steel parts on a 3-inch Warner & Swasey 2AB Single Spindle Bar Automatic is but one major advantage realized by Dearborn

Actually, three major factors led Dearborn Manufacturing Company to select the Warner & Swasey 2AB Single Spindle Bar Automatic:

1. The ability to hold tolerances to .001 on diameters; .002 on lengths; concentricities to .001 T.I.R., thus reducing secondary operations.
2. Tooling interchangeability with major customers also using Warner & Swasey 2AB's and 2AC's.
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CIRCLE INFORM-A-GRAM KEY NO. 2

TOOLING & PRODUCTION Magazine

VOL. XXVI, No. 11
FEBRUARY 1961

FEATURES IN THIS ISSUE:

"personally speaking . . ." 4
Ray Huebner, Publisher

Talk of the Month 8
"Future Economic Levels" by Ralph J. Cordiner, Chairman, General Electric Company. His talk, given before the National Foreign Trade Council in New York, deals with the universal drive for economic growth.

One More Society Needed 37
Editorial by William E. Hoffman
One of our greatest opportunities is to build upon the knowledge of others. Could a new society contribute to our advancement and well being?

Are We Getting The Most Out Of Our Carbides? 39
Firth Sterling's William Montgomery shows how you can benefit by plotting tool life curves.

Job Shop Specializes In Tape Control 43
Associate Editor Weiner describes the development of a shop equipped with a half-million dollars worth of first-of-a-kind numerically controlled machines.

He Needs A Lot Of Horses For This Big Bite 46
Assistant Editor Larry Curran "case histories" a carbide turning job on heavy cast steel backup rolls.

Machinable Carbides Reduce Downtime and Improve Production 47
Hard titanium carbide particles embedded in a matrix of tool steel enable you to machine your own special carbide tool shapes.

Turn over for additional Contents

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Cutting Tool Geometry Selector **50**
The Cover Story
With this unique fixture, cutting tool geometry can be originated and verified on a cut and try basis by observing the chips formed from paraffin wax.

Make It For Less, And Better, From Tubing **52**
Here's a noteworthy approach to "stamping" parts out of tubing.

Carbides, Ultrasonics Tackle A Cutting Problem **58**
A NASA Development in cutting the uncuttable.

Versatile Cutter For Spherical Shapes **62**
A simple attachment that can eliminate expensive profiling machines.

New Grinding Line **64**
A Hill Acme, Behr-Manning and Wallingford Steel team play.

DEPARTMENTS IN THIS ISSUE:

Catalogs—and other helpful literature 72

Product News 84

Advertisers' Index 114

TOOLING & PRODUCTION MAGAZINE

Vol. XXVI, No. 11 George J. Huebner, Founder 1885-1956

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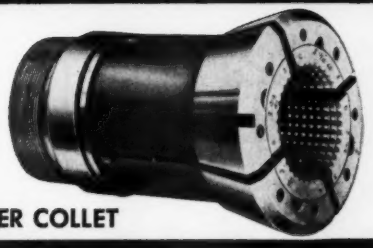

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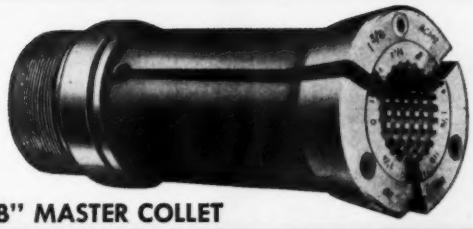

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CIRCLE INFORM-A-GRAM KEY NO. 4

personally speaking...

Dear T & P Reader:

Starting with our January 1961 issue, a few changes became effective in our Roster of Editorial Personnel. The principal change was the appointment of William E. Hoffman as Editor of Tooling & Production. E. Willard Pennington, who held that title for many years, becomes Editorial Director and this principally means that he is being relieved of much of the pressure that the editor must accept. Actually, any man who undertakes handling the job of editor of a business paper is a very strong and courageous individual. And, he is always dedicated to attempting to please you and every other reader of his magazine and this, of course, is a large order.

How did you like the two front covers that editor Hoffman has come up with in 1961? January, of course, symbolized numerical control and the cover on this February issue features a very interesting and intriguing device. We have been proud to present both of these covers and we hope they have pleased and interested you.

Incidentally, we're continually looking for cover features portraying subjects which hold promise of being interesting to all men like you. If you are aware of anything color photogenic in your plant that would be interesting or significant to others, please tell us about it.

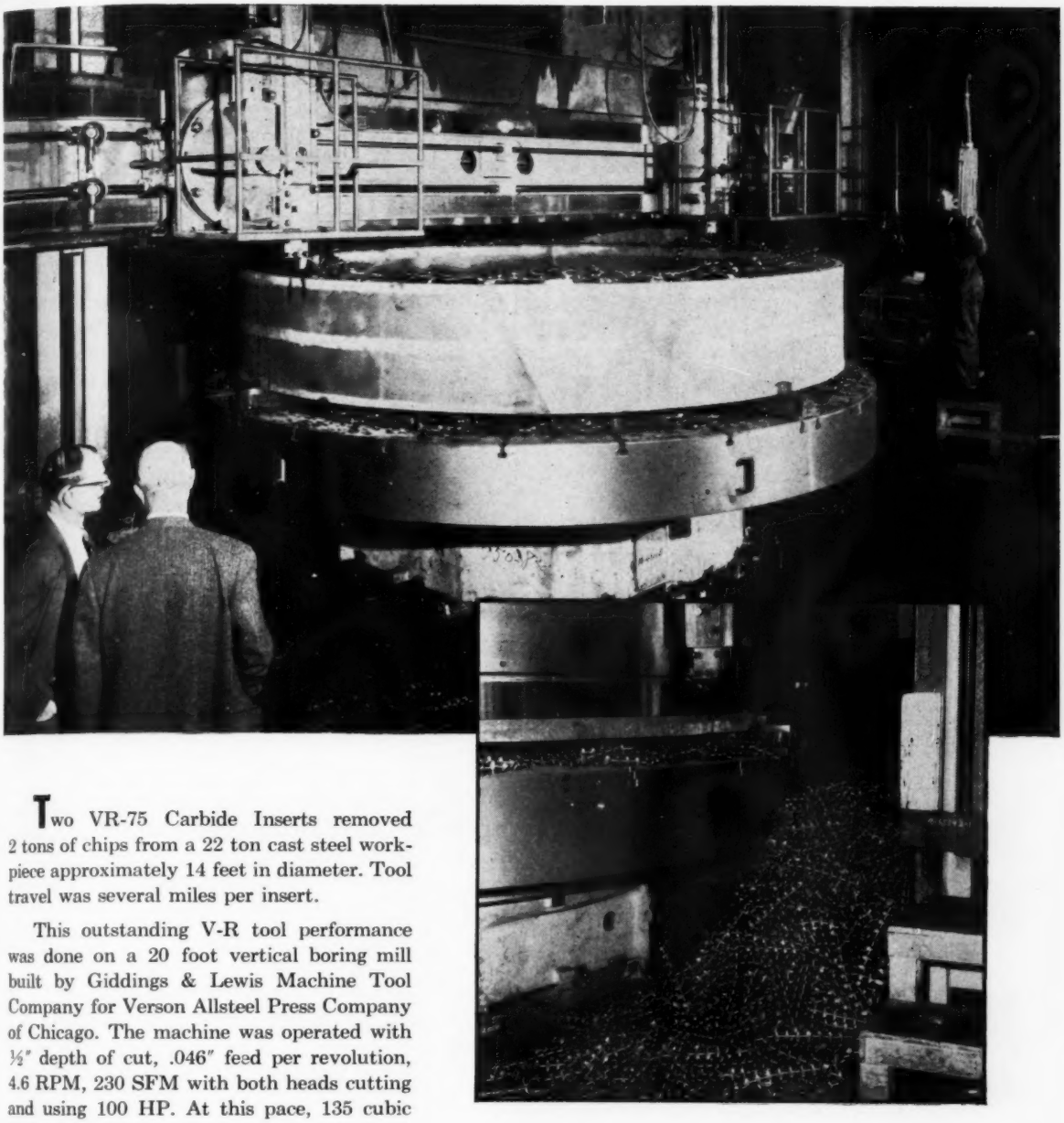
We believe you will find this entire issue of Tooling & Production very interesting. Articles in this issue, as you will observe, feature carbides and ceramics and there are, I am sure, quite a few valuable ideas for you. After you have read this issue, our editors would very much appreciate your indicating on an Inform-A-Gram card the name of the article which interested you most.

As I write this letter, I'm conscious of quite a few opinions being expressed to the effect that many inventories during the past six months have been allowed to dwindle until today they are at the point of needing replenishment. If you have anything to do with inventories in your company, perhaps if you haven't already done some checking lately you might welcome my suggestion that you do it now. Some authorities express the thinking that we're in for a reversal in the trend of business soon. And, of course, the time to buy most advantageously is when there isn't much buying competition for the things you need. This applies to labor-saving and cost-saving products as well as materials. There are many things you can get immediately today for which you might have to stand in line two or three months from now and that might be real inconvenient.

Cordially yours,

Ray Huebner

Publisher



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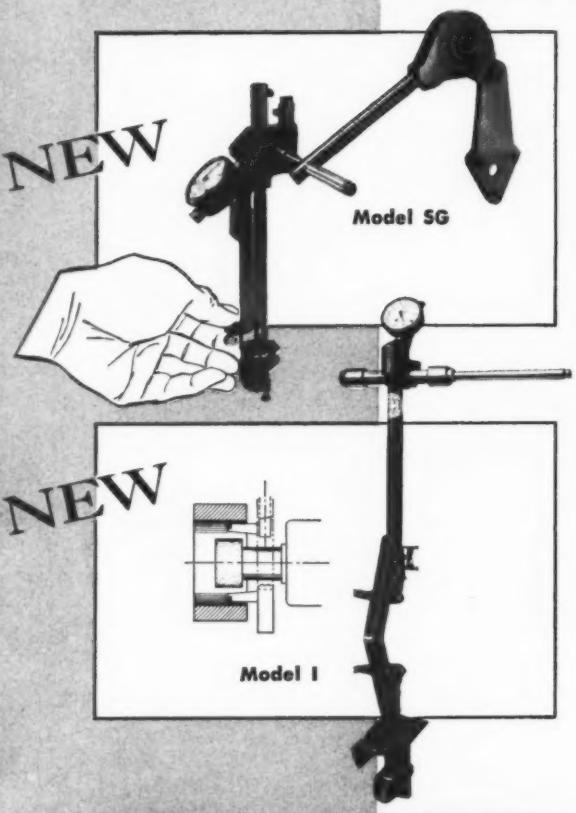

Here are three new Arnold Grinding Gages. The Miniature (SG) and King Size (LG) Models now permit continuous measurement for O.D.'s from .060" all the way up to more than 30". And, for the first time, there is an Arnold Grinding Gage to continuously measure I.D.'s. These, like all Arnold Gages, eliminate having to "grind and check". Size of part is shown continuously as metal is being removed, so operator always has positive and precise size control without having to stop his machine until the piece is finished. No oversize regrinds . . . no undersize rejects.

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- Turret-mounted indicator rotates to any position
- Easy to position and retract

FOR LARGE O.D.'s Model LG
- Continuously measures diameters up to 30" and larger
- Single dimension or wide range adjustable calipers
- New ball bearing mounting
- Rigid, heavy duty frame

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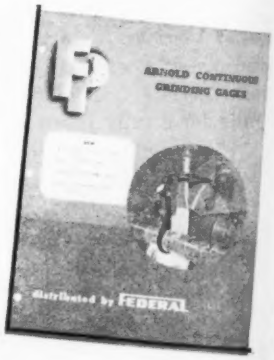

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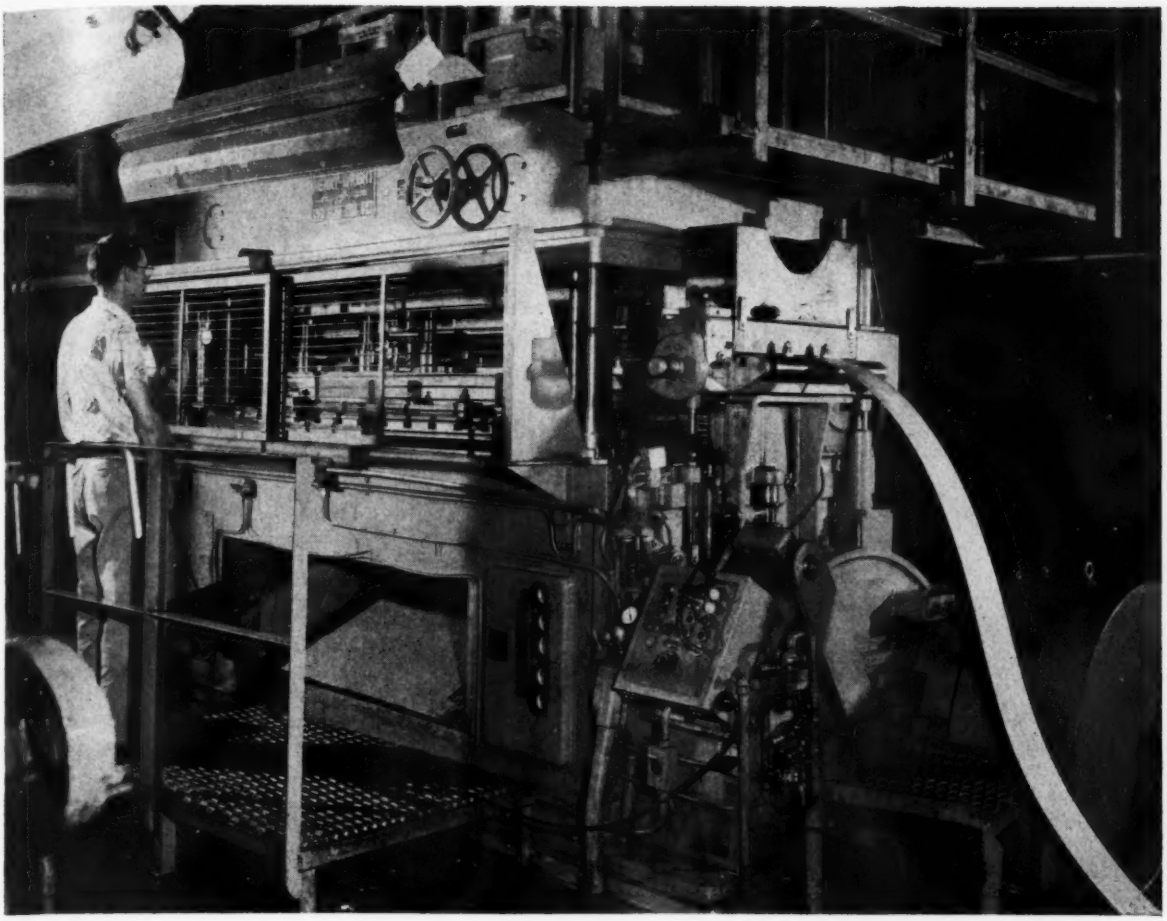
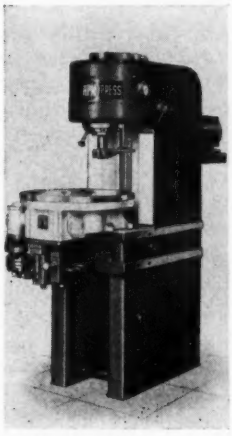


84 INCH, 17 STAGE DIE; 80 PARTS PER MINUTE

TOO CUSTOM TO CATALOG

Just right for the job. This special hydraulic laboratory press, 1000-ton capacity, is typical of the custom presses available from H-P-M. Heavy duty metal-working and process presses, such as this, have special power and control elements.



BENCH PRESS AUTOMATION

The H-P-M C-Press, equipped with hydraulically interlocked index table provides unit automation for small parts production. Fast, accurate, positive table action is extremely versatile. Manual and automatic presses 5 to 15-ton capacity.

Henry & Wright Dieing Machines stamp and form to precision tolerances even with severe off-center loading conditions. This double crank press has better distribution of die loading with a smooth pulling rather than a pushing stroke. Dies last longer. Henry & Wright machines have a lower center of gravity; the frame is more compact and rigid. You can produce stampings requiring higher pressures with greater precision and less die wear. If you are re-tooling for greater cost-savings, get the complete specifications for Henry & Wright machines.

H136

HPM

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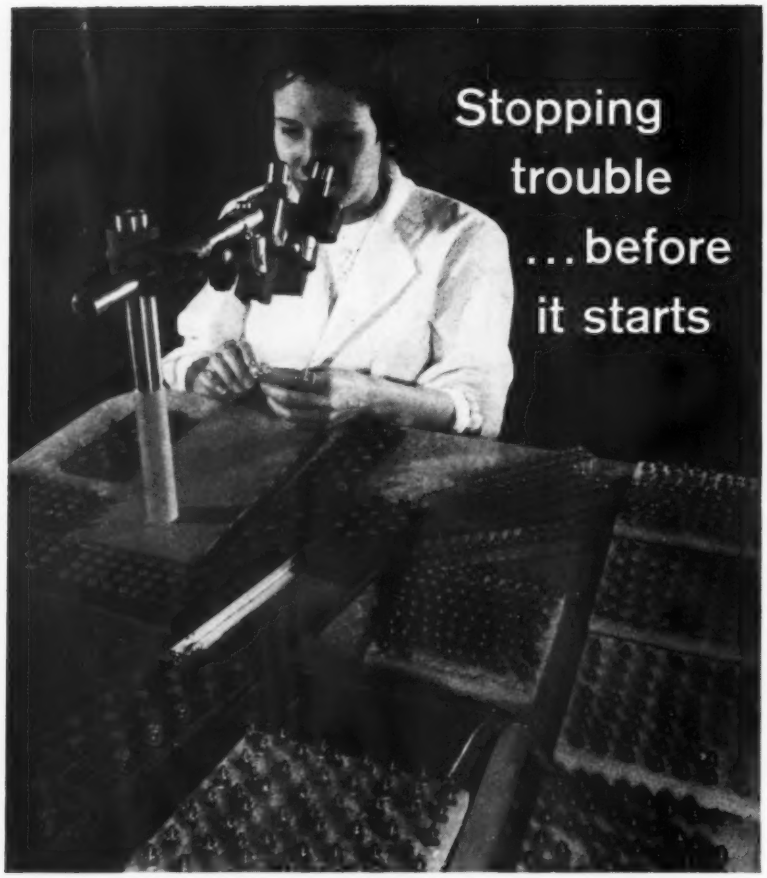

B&L Stereomicroscopes help RCA keep quality high

RCA's new thimble-sized nuvistor electron tube improves TV reception in difficult areas. It does so many jobs so well that industry's demands have increased production 800% within a few months of its introduction.

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CIRCLE INFORM-A-GRAM KEY NO. 8

Talk of the Month

Future Economic Levels

by Ralph J. Cordiner

Mr. Cordiner is Chairman of General Electric Company, Schenectady, N. Y. The talk excerpted here was presented at the National Foreign Trade Council Dinner in New York.

ALL PEOPLE of the world have an "irresistible determination to achieve new and higher levels of economic development," according to Ralph J. Cordiner, General Electric Co. chairman.

"This universal drive for economic growth has in it the seeds of much trouble in the decade ahead, but on the whole it is an ambition so widely held that it can help unite people in free nations and build better understanding among them.

"We in the free world must help this greater endeavor succeed, for it is a means by which all the people on the earth can lift themselves to a new life of dignity, freedom and achievement." Mr. Cordiner warned of the communist conspiracy to exploit the situation, and pointed out that in the task of thwarting the communist efforts, the businessmen of the free world have a larger role than is generally recognized.

"It is natural, perhaps, in a 'cold war' period, that the spotlight has been on governmental activities. Yet without understanding the importance of governmental loans and grants, the much larger resources for international economic development in the long run lie in the area of private trade and investment."

Discussing the fundamental considerations on which individual

. . . Continued on page 10

Recent help-wanted advertisement appearing in Minneapolis Morning Tribune.

Must be experienced. Call Mr. York or Mr. Rose at TU 8-5922.

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Why this plant can afford top pay and overtime on its Moore Jig Grinder

This versatile precision machine has been a *night-and-day* moneymaker throughout the twenty-odd years since Moore pioneered the principle of Jig Grinding. Ask any Moore owner! Ask Carl A. Berg, for example, who ran the above advertisement for his new No. 3 Moore Jig Grinder in a Minneapolis newspaper recently.

That's because Jig Grinding is the happy answer to the ever-present problem of accurately locating and grinding holes, contours and surfaces to size in hardened steel and carbides. The No. 3 now holds tolerances to *less than a tenth!* See positioning accuracies under photo of the machine at right.

Mating parts such as punches and dies can be finished concurrently and made to figures by Jig Grinding with the Moore, rather than just "to fit." Service life is greatly increased, because fits are more accurate, alignment is assured and surface finish is improved.

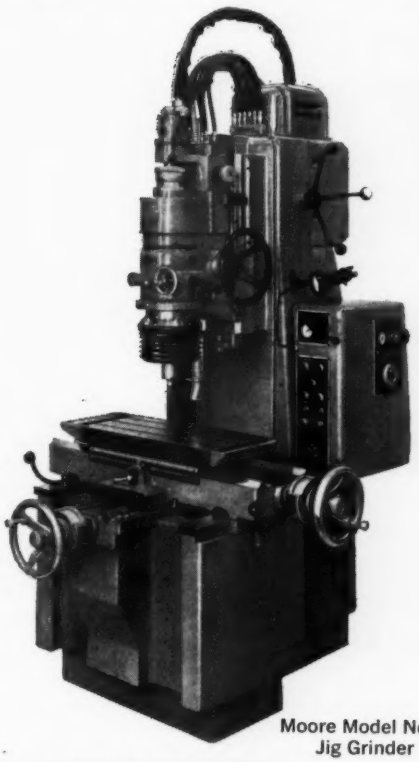
The flexibility and accuracy that make it a "must" for toolroom applications also make the No. 3 Jig Grinder a key machine in model, experimental, precision machining, and development work. Here, prototype and critical parts are quickly produced to the closest tolerances required.

When users offer top pay and overtime to operators of this busy machine, *they do so because it earns that kind of return* ...for toolroom, production, experimental laboratory and inspection assignments.

May we prove it to you?

MOORE SPECIAL TOOL COMPANY, INC.
726 Union Avenue, Bridgeport 7, Conn.

HOLES, CONTOURS AND SURFACES, Moore's authoritative book of 424 pages, 495 illustrations on tool, die and precision parts production, includes these fine chapters: "Jig Grinding Principles and Applications," "Jig Grinding Holes," and "Jig Grinding Contours." $5 in U.S.A., $6 elsewhere.



Moore Model No. 3 Jig Grinder

ACCURACY OF POSITIONING

LONGITUDINAL TRAVEL:
Greatest error in any inch ..... 30 millionths
Greatest error in 18 inches ..... 90 millionths

CROSS TRAVEL:
Greatest error in any inch ..... 30 millionths
Greatest error in 11 inches ..... 90 millionths

SQUARENESS:
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Travel, spindle housing ..... 90 millionths in 13"
Travel, spindle ..... 90 millionths in 3⅝"

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CIRCLE INFORM-A-GRAM KEY NO. 9

. . . Month's Talk from page 8

companies can build a long-range policy for international business in such a climate, Mr. Cordiner outlined a managerial strategy based on 1) maintaining the strength of the domestic economy while meeting foreign competition, 2) stimulating international trade and 3) expanding overseas operations.

"As a matter of prudence and patriotism, the business manager should first consider his established base in the home country. It is my belief that a balanced managerial strategy for a United States company must include not only a sound long-range approach to international operations, but also a planned effort to maintain the strength of its operations here in the United States.

"While this country has no monopoly on technical skill, venture capital, or high-grade industrial capacity, it is certainly the largest single bloc of such assets in the world today. As such, it is the pivotal position of economic strength for the entire free world. No free nation, no businessman anywhere, would benefit from policies that would allow the United States economy to deteriorate or in any way lose its expansive vitality."

Meeting Competition

Mr. Cordiner emphasized that he was not among those who are pessimistic about the capacity of this nation's industry to meet foreign competition in the United States market, or at least keep it within manageable proportions. "This can be done," he said, "particularly in the capital-intensive industries whose products do not have a high labor content and in industries which, with full automation, will approach such characteristics.

"It will require ingenious management, diligent and cooperative employees, ceaseless innovation, greatly accelerated investment in automation, greater responsibility on the part of union officials who seem determined to price their union members out of the domestic as well as the world market, continued control over inflation, and some constructive changes in government policy."

He said that in meeting competitors who have lower costs, and just as attractive products and values to offer, "this country's best defense is a vigorous technological offensive.

"We must develop new businesses, new products, and new processes that cannot be easily matched. Primarily, these are the businesses that require a high capital investment, a highly educated labor force, and a highly advanced technology."

Overseas Trade

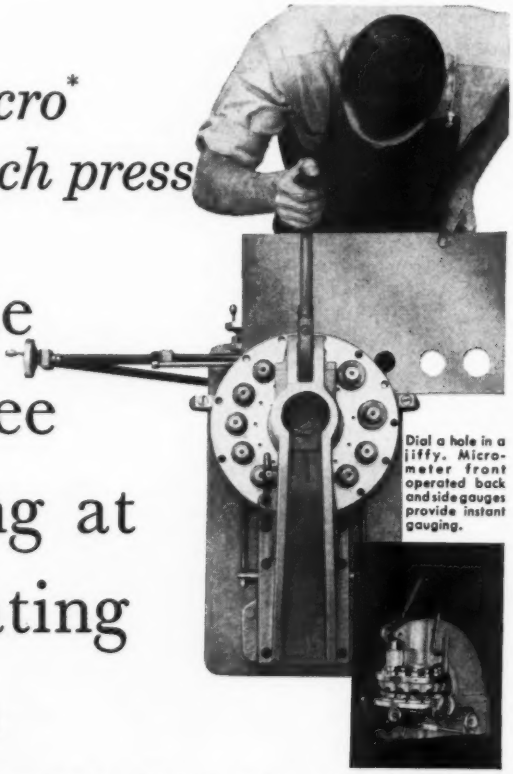
On the subject of stimulating international trade, Mr. Cordiner said, "There are two fundamentals that seem to apply to any company, here or abroad, that is interested in exports:

1) Make a significant and continuing commitment to the cultivation of overseas markets. The timid, half-hearted commitment will never become a significant

. . . Continued on page 12

new Di-Acro turret punch press*

Accurate Burr-Free Punching at 12 Rotating Stations



Dial a hole in a jiffy. Micrometer front operated back and side gauges provide instant gauging.

The new Di-Acro 4 Ton Turret Punch Press provides rapid, close tolerance punching of round, square, oval and rectangular holes from 1/16″ to 2″.

Rotating turrets provide rapid indexing for single or sequence punching. Precision hole location quickly obtained with Micro-twin gauges. Punches sheet metals up to 16 gauge mild steel, fibreboard, asbestos, paper, cork, leather, rubber, plastic and other sheet materials.

Dies are mounted in turrets—always handy. Standard clearance between punch and die is .002″. Choice of 6 other clearances at no charge. The Di-Acro Turret Punch Press is safe, simple to operate—requires little maintenance.

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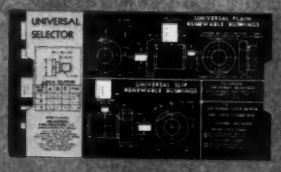

The Universal Drill Bushing Slide Chart gives accurate engineering data for the selection of all types and sizes of drill jig bushings up to 1¾" drill size. Request your calculator—free—on your company letterhead.

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FOR POSITIVE HOLDING OF COMPONENTS IN JIGS AND FIXTURES...

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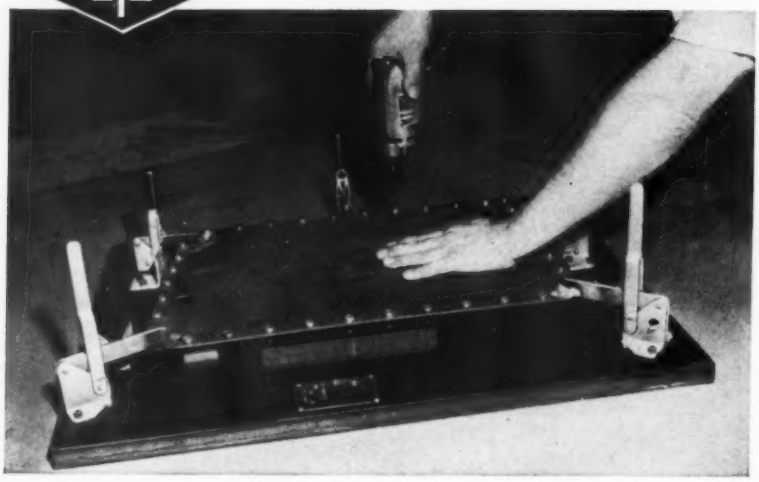

Simple drilling fixture made up of 5 toggle action clamps mounted on a plywood base holds drill bushing plate firmly in position.

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CIRCLE INFORM-A-GRAM KEY NO. 12

. . . Month's Talk from page 10

source of profit. Instead, to develop a serious export business a company must organize for sustained effort.

2) A sound export business should lead from strength. Cultivate export markets for those lines in which your company has already established the advantages of substantial volume and design leadership in your home market."

Mr. Cordiner called particular attention to the rising trend of establishing operations in other countries as another way in which United States firms can participate in the growing markets overseas. "The essence of a sound business strategy here is to integrate the interests of the share owners, the home country, and the host countries. None of these interests can be slighted without weakening the entire structure over the long term.

"Investment in the growing economies of such industrially mature areas as Western Europe and Japan provides the share owners an attractive diversification with high growth potential, as well as reasonable assurance that their private investment will be respected and protected.

"On the other hand," he continued, "the prudent interests of share owners are not so easily determined when the decisions involve commitments in the less developed areas of the world, usually characterized by less stable political and fiscal institutions. The risks to share owners in investing in these undeveloped countries can be reduced by two basic policies:

1) Companies should be slow to invest where they are not wanted. Investors understandably tend to avoid countries where they meet with gyrating currency, exchange controls, confiscatory taxation, expropriation, legal discrimination, and nationalist restrictions on management.

2) Political regimes come and go in most underdeveloped countries. The key to survival through a variety of regimes is to make the company so visibly useful, not only to the few who may be in power, but to the fundamental needs of the people in that country, that the business rests on a basis

. . . Continued on page 14

Here's the quick, low-cost way to get any Controlled Surface Finish

Are you paying more than necessary to obtain *controlled surface finishes?* You probably are if Gisholt Superfinishing is new to you. You are losing time, money and paying a premium for quality as well, on many jobs.

With Superfinish you preselect the surface finish you need—as high as 80 or as low as 1 micro-inch RMS—and you get it faster, at less cost than by any other method. Rather than an expensive extra step, Gisholt Superfinishing actually eliminates tedious, more costly processes.

Not only do you save time and money, but you get a "controlled" surface finish, free of smear metal—with the true base metal exposed—one that provides greater area contact for heavier loads and longer life in your specific application.

Whether your job requires a 1, 20 or 80 micro-inch finish, setup is fast and easy. Nothing is left to the operator's skill or judgment. Stone pressure and grade, and reciprocation rate are preselected to produce the finish you require, for job lots or large production runs.

It will pay you to find out how Gisholt Superfinish can cut costs, improve quality and lengthen service life on your standard or problem parts. Ask your Gisholt Representative or write for Bulletin 1169.

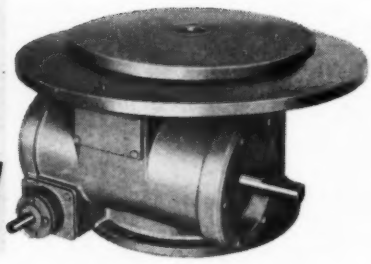
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee*

CIRCLE INFORM-A-GRAM KEY NO. 13

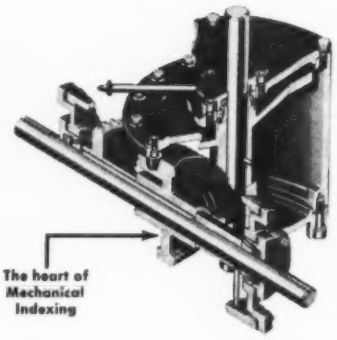
Why Index Mechanically



Important Features of Mechanical Transfer–

● SHOCK FREE TRANSFER OF MASSIVE LOADS

Made possible by cams designed and built to precise specifications to provide a high speed index or transfer motion with controlled acceleration and deceleration. Transfer is never free—it is always contained by a tapered follower in the tapered cam path.



The heart of Mechanical Indexing

● ACCURACY OF INDEX

No other means provides such a high degree of precision repeatability of index. Regardless of number of positions accuracy is maintained by two followers which straddle the dwell portion of the cam.

● SYNCHRONIZED TOOLING ACTUATION

Continued motion of the index cam shaft provides the power and basic motion for tooling actuation with positive mechanical interlock.

● INHERENT LOW MAINTENANCE

Standard Tool indexing equipment is practically maintenance-free due to its extreme precision manufacture and its carefully balanced components. Tapered roller bearings used throughout provide long durable service.

● TECHNICAL BOOKLETS

Fact-filled booklets showing indexing positions, tolerances, available dial and tooling plates, load ratings, dimensions and other information are available without cost. Standard Tool engineers will be pleased to assist you in selecting the indexing unit best suited to your particular requirements.

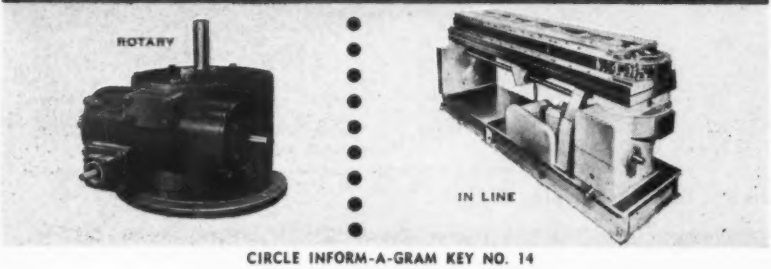
Better Products at Lower Costs thru Better Methods!

MACHINERY DIVISION

STANDARD TOOL & MANUFACTURING CO.

706 SCHUYLER AVENUE LYNDHURST, NEW JERSEY

SELECT FROM A FULL RANGE OF UNITS—IN LINE OR ROTARY



CIRCLE INFORM-A-GRAM KEY NO. 14

. . . Month's Talk from page 12

of popular support and usefulness which all politicians feel obliged to respect. Even this, of course, is no assurance of invulnerability, but it is the most solid rock on which to build in a period of social and political change."

Investments for Freedom

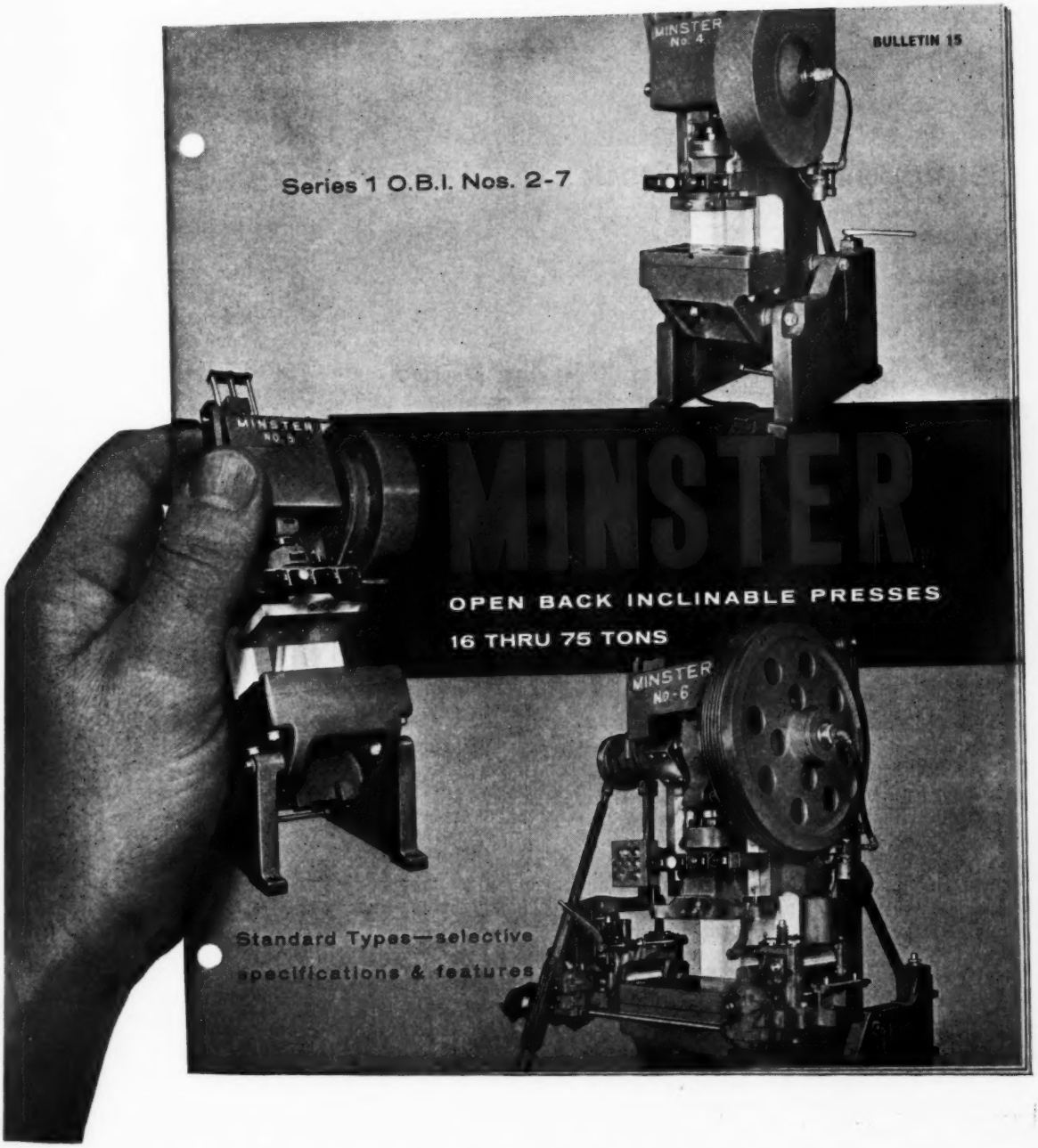
In making the point that an overseas operation must also be consistent with the interests of its home country, Mr. Cordiner said, "Any overseas investment by a United States firm today is made in the context of the worldwide struggle with communism.

"The United States is trying to help other nations develop strong, independent economies and social structures that are not vulnerable to communist penetration. Every responsible American business operation overseas that truly becomes a constructive member of the local community is an operating beachhead for freedom. It is extremely important that the traditions of responsible private enterprise be established around the world, particularly in the new nations, as a foundation stone on which open societies can be built over the years."

Mr. Cordiner also emphasized that companies which aim to exploit a foreign country, and add little or nothing to its development, damage the reputation of all private enterprise. He said that operations established by United States firms overseas should aim to help the host country achieve its national aspirations.

"It is a popular cry of the demagogue that all investment from foreign sources is a variety of exploitation, and one well-known route to office is to denounce the so-called 'exploiters.' But while the unfortunate situation in Cuba may make the headlines, there are many more countries where level-headed and dedicated governments are sincerely trying to build a better life for their people. They realize that the investment of fresh capital from overseas is a great multiplier, producing new levels of economic activity many times the size of the profits earned by the investor."

end

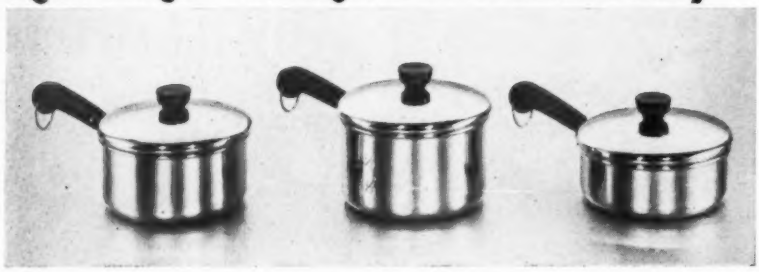


The "Hidden Strengths and Values" of Minster O.B.I. presses... points of superiority that only Minster offers the O.B.I. user . . . are outlined in this new Bulletin 15. It will help you make comparisons when next you buy an O.B.I. May we send you a copy? Write or call . . .

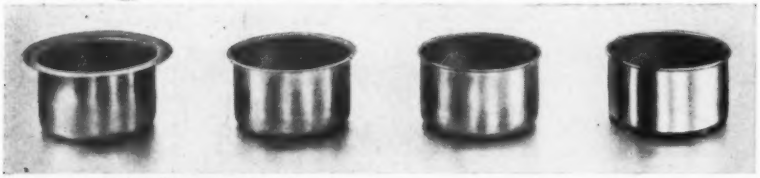
The Minster Machine Company, Minster, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 15

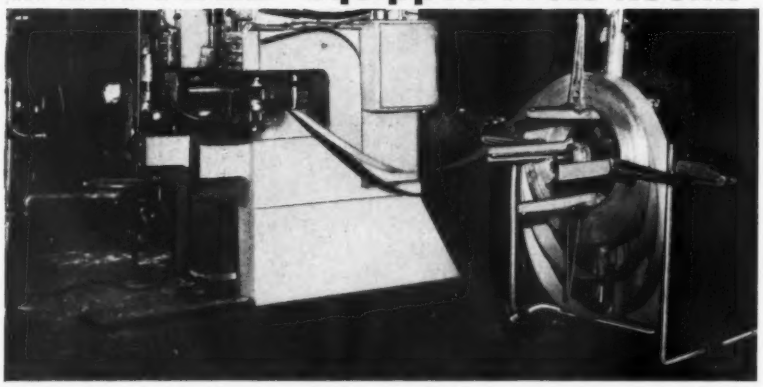
REVERE WARE Stainless Beauty



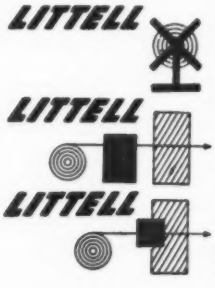
Is Shaped from Coil Stock



In *LITTELL*-Equipped Press Rooms



The coil stock of gleaming stainless steel that is precision stamped into beautiful Miniature Revere Ware calls for careful handling. Revere production men make sure that the stock is un-marred and properly straight by using Littell Reels and Straighteners exclusively. Where feeds are required, Revere Presses are equipped with Littell Roll Feeds. For Revere Copper and Brass, Incorporated, is another of the long list of distinguished firms whose production men have found that stamping operations are most efficient when the punch press is served by Littell Reels, Straighteners and Roll Feeds. Write today for full catalog information.



LITTELL REELS supply the stock in a smooth, even flow.

LITTELL STRAIGHTENERS remove coil curvature, send flat stock into the press.

LITTELL ROLL FEEDS push the straightened stock into the die area in perfect timing with the press stroke.

COILY Says:
"Whether you stamp large or small parts, simple or complex pieces, Littell Equipment brings your press to peak efficiency."
Write for Catalogs "A", "C", and "D".

F. J. LITTELL MACHINE CO.
4197 N. RAVENSWOOD AVENUE, CHICAGO 13, ILLINOIS
CIRCLE INFORM-A-GRAM KEY NO. 16

At Last . . .

An unprecedented plan to concoct a new language of engineering, and create a basic core of scientific critics among leading engineering executives, is under way.

Specifically designed to train scientific and industrial leaders in making technical decision of far-reaching social and economic impact, a course called "Modern Engineering for Engineering Executives," will be given at UCLA. Coordinator of the program is J. Morley English, professor of engineering at UCLA. The teaching staff will include Dr. Edward Teller, Dr. Willard Libby and other known specialists in related fields, drawn from both UCLA and corporate ranks.

"The situation regarding the engineer-executive," according to Professor English, "is serious. His technical knowledge tends to become outdated so fast that within 15 years after he has completed his education, his knowledge of facts, his concepts of methodology in design and other details are just about half of those which the newly-graduated engineer possesses.

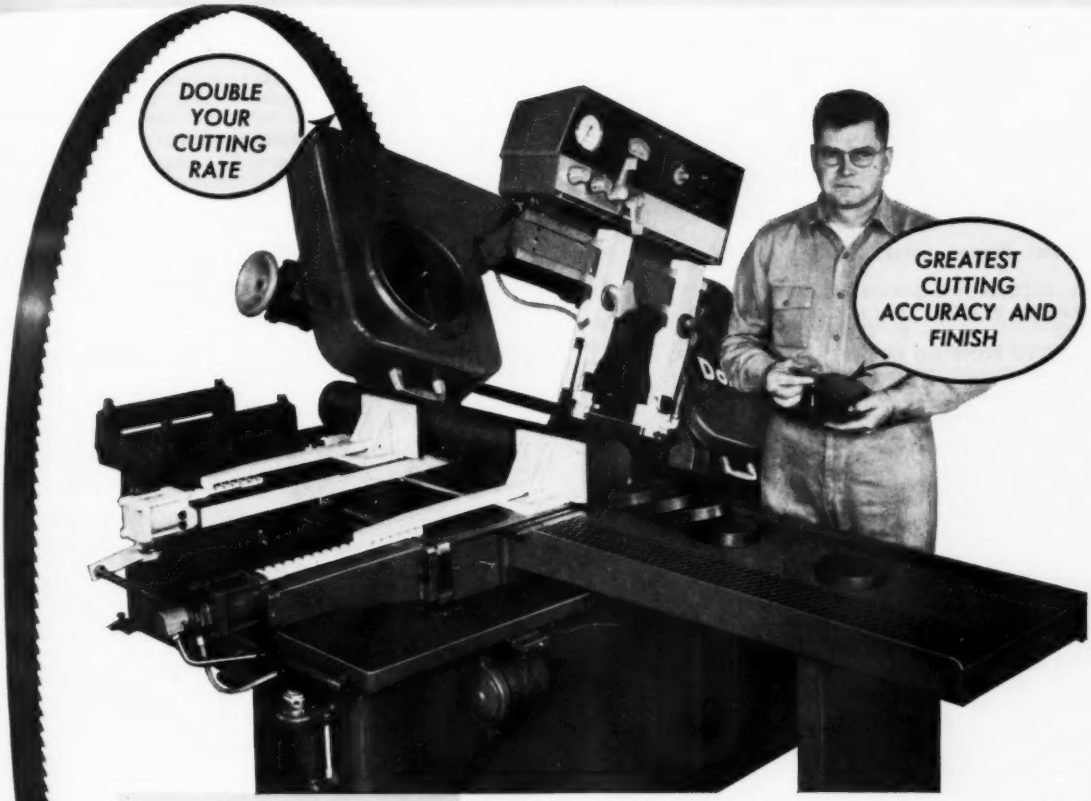
"His years of experience somewhat make up for his education decline, but he needs help to be more efficient and more skillful in his technical and managerial decisions."

W. Clare Ennis, extension specialist and associate coordinator, points out that "the advisory and instructional staff is perhaps the most select group that has ever been asked to participate in any given project at the university. We held a national meeting of the participants early this month to let them tear our plans apart, or to give it their imprimatur, which they did with collective enthusiasm."

According to the schedule, enrollees will go to class six days a week, with evenings devoted to supervised study periods. A special advanced topic will be presented each Wednesday evening by a leading authority in the forefront of technology starting June 11.

Special texts and study plans are currently being prepared under the supervision of Dean L. M. K. Boelter and advisory committee.

NEW DoALL Machine Tool With NEW Tungsten Carbide Blade



New Cut-Off Rates

MATERIAL	SIZE	DoALL TIME
4340	7" dia.	2.9 min.
1018	6-3/16" dia.	1.25 min.
1020	5" dia.	49 sec.
18-8 Stainless	7" sq.	8 min.
Stentor	6" dia.	3.8 min.
1117	3¾" dia.	27 sec.
1020	6" dia.	1.2 min.
4340	11¾" dia.	8 min.
Ketos	11¾" dia.	8 min.
4140	5¼" dia.	2 min.
8620	10½" dia.	7.5 min.
4150	9" dia.	5 min.

Wait till you see this team cut your stock to lengths. It's terrific! With tremendous cutting ability, DoALL's revolutionary TUNGSTEN CARBIDE Saw Band on an entirely new power saw is the team that wins again. It delivers by far the fastest cutting rates ever achieved by any band tool cut-off saw, together with the remarkable accuracy and finish for which the DoALL Power Saw is famous.

Automatically operated, the machine has the power to drive the TUNGSTEN CARBIDE Band up to 450 fpm. It offers broad feed force range, self-adjusting carbide-faced saw guides, automatic chip conveyor, plus many other features.

For lowest cost, highest cut-off productivity, mail us this coupon . . .

PS-18

This is a typical DoALL Store

ASK FOR A DEMONSTRATION TODAY!

THE DoALL COMPANY, Des Plaines, Illinois

We would like to see a demonstration of the new DoALL C-70 TC Power Saw in our plant—without cost or obligation.

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- ☐ **BORING** methods, machines and miscellany for making close-tolerance holes by W. E. Hoffman. **$ .75**
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- ☐ **MACHINING, HEAT TREATMENT & PICKLING OF STAINLESS** by Lester F. Spencer, 36 pages on the working of stainless steel. **$1.50**
- ☐ **MANUAL OF MACHINABILITY AND TOOL EVALUATION** by Antoni Niedzwiedzki. Tool life formulas, tool life criterion, chip load and workpiece hardness, tool geometry, test records, tool inspection, machinability classification, machine tool selection, and much other valuable data including graphs, drawings and recommendations. **$6.00**
- ☐ **MATHEMATICAL PROGRAMMING** by Reinfeld & Vogel. 274 pages. The practical application and use of mathematics in industrial programming. **$8.00**
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- ☐ **PLASTICS ENGINEERING HANDBOOK**, compiled by The Society of the Plastics Industry. 850 pages. **$15.00**
- ☐ **THE PRINCIPLES OF INVENTORY MANAGEMENT** by Nyles V. Reinfeld. An authoritative 32-page treatise on the economic aspects of analysis within your existent inventory control system. **$2.00**
- ☐ **PRINCIPLES & METHODS OF SHEET METAL FABRICATING** by George Sachs. 1951; 537 pages. Describes in detail sheet metal forming methods, metallurgical effects in stamping, drawing, extruding, bending; design of parts and dies, etc. **$11.00**
- ☐ **PRODUCTION CONTROL** by Nyles V. Reinfeld. 1959; 340 pages. A practical guide to the principles and functions of production control—details forecasting, scheduling and inventory techniques—incorporates up-to-date research from 500 companies. **$8.00**
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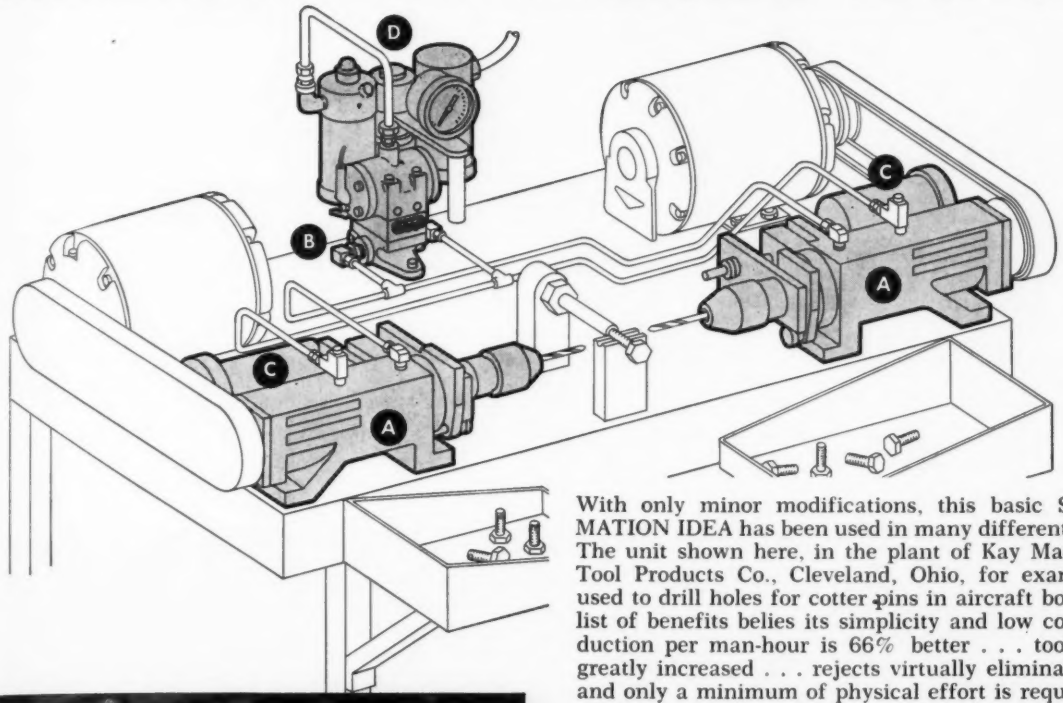
YOUR OWN MEN CAN BUILD THIS PRECISION MACHINE FOR CUTTING COSTS IN DRILLING METALS, PLASTICS AND WOOD



As shown in the photo above and "keyed" in the drawing, this shop-built drilling machine consists essentially of two low-cost, air-operated Bellows-Locke Model 22A Drill Units (A), a Bellows Electroaire® operating control valve (B), two Bellows Hydro-Checks® which provide smooth precision operation (C) and a Bellows Lubri-Air® Control Unit which cleans, regulates and lubricates the air supply (D). Not visible is the foot-operated control pedal.

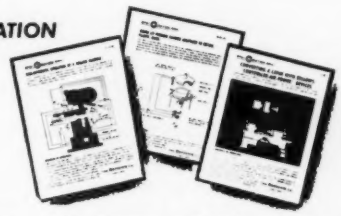
697C-3

With only minor modifications, this basic SPOT-A-MATION IDEA has been used in many different plants. The unit shown here, in the plant of Kay Machine & Tool Products Co., Cleveland, Ohio, for example, is used to drill holes for cotter pins in aircraft bolts. The list of benefits belies its simplicity and low cost: production per man-hour is 66% better . . . tool life is greatly increased . . . rejects virtually eliminated . . . and only a minimum of physical effort is required for what formerly was a very fatiguing operation.

The machine is built around two compact interlocked Bellows-Locke Model 22A Drill Units — air operated, hydraulically controlled — mounted horizontally in opposed positions. Automatic feeding, positioning and ejection could be incorporated easily by the addition of other Bellows "Controlled-Air-Power" Devices. This SPOT-A-MATION IDEA can be readily adapted to perform a wide range of other operations, such as punching, forming, riveting, crimping, etc., by using such other Bellows work units as The Bellows Air Motor® in place of the Drill units.

This machine is typical of the ways cost-conscious men the world over are using Bellows "Controlled-Air-Power" Devices to secure faster, better, lower-cost production. Opportunities exist in your plant, too. Why not investigate — *today!*

THIS "SPOT-A-MATION IDEA" FILE IS YOURS ON REQUEST



Contains installation data, wiring diagrams and equipment lists for the "Spot-A-Mation" idea sketched above, as well as for scores of similar ideas you can use. Write Dept. TP-261, Bellows-Valvair, Akron 9, Ohio.

Bellows-Valvair

AKRON 9, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

CIRCLE INFORM-A-GRAM KEY NO. 19

Another New Fastener Idea From Parker-Kalon

The New PARKER-KALON **W-POINT** Socket Set Screw

T.M. U.S. PATENT NO. 2,907,245

Now you can get the highest degree of holding power ever attained!

30% more back-out torque 50% more resistance to vibration 50% more resistance to rotary slippage

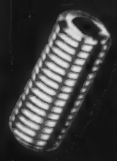
Like many important advances in technology, the Parker-Kalon W-Point concept is simple and straightforward. In use, its superior performance and holding power will be demonstrated to your own satisfaction. Available from P-K distributors at no increase in cost.

A COMPLETE LINE OF SOCKET SCREWS TO MEET EVERY REQUIREMENT!

SOCKET HEAD CAP SCREWS

Heads are of uniform diameter. Threads Class 3A tolerance. Available in standard sizes from #0 to 1½" diameter in alloy steel and from #0 to ⅜" diameter in stainless steel. Available in 1936 and new 1960 "Pre-Lode" Series.

SOCKET SET SCREWS



Precision Class 3A threads, standard in Cup Point from #0 to 1" and in Flat, Oval, Cone and Half-Dog Points from #4 to ⅜". Cup Point also available in stainless steel.

SHOULDER SCREWS

Threads Class 3A tolerance. Heads are concentric with body for uniform, accurate assembly. Available in standard sizes from ¼" to ¾" diameter.

FLAT HEAD SOCKET CAP SCREWS

Seats flush when countersunk. Heads have uniform 82° angle. Threads Class 3A tolerance. Special alloy steel, heat treated. Available in standard sizes from #4 to ¾".

BUTTON HEAD SOCKET CAP SCREWS

Heat treated alloy steel. Accurate hex sockets make for non-slip driving, prevent mutilated heads. Threads Class 3A tolerance. Standard sizes from #4 to ⅜".

SOCKET SEMS

P-K is the only fastener manufacturer to provide socket Sems, to meet your needs for precision-made socket head cap screws with split ring washers.

HEX KEYS

Made of special analysis alloy steel, scientifically engineered. Heat treated for optimum physical characteristics. Made to close tolerances.

DOWEL PINS

SOCKET PIPE PLUGS

Now you can get all of these famous P-K® quality socket screws with or without

the vibration-resistant **LONG-LOK® INSERT!**

Look at that groove! It's P-K's secret weapon against vibration. Filled with Polycap nylon-type polymer, it solves a thousand and one problems where vibration is present . . . where adjustment is required . . . where reuse is a factor, over a wide temperature range.

- *Provides higher resistance to shock*
- *Higher percentage of reusability*
- *Superior thread engagement and locking force*
- *Eliminates need for lock washers, safety wires*
- *The Long-Lok insert is available on P-K Socket Head Cap Screws, Set Screws, Flat Heads, Button Heads, Shoulder Screws and Pipe Plugs.*

PARKER-KALON

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KEEP AMERICAN INDUSTRY AT WORK . . . BUY P-K . . . MADE IN U.S.A.

FULL LINE FRANCHISE AVAILABLE IN SELECTED TERRITORIES. • FOR INFORMATION, CONTACT THE PARKER-KALON SALES MANAGER, CLIFTON, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 20

Temperature Magnetism Phenomena

Discovery of a new metallic compound with unique on and off magnetic characteristics was reported here today by scientists of the Du Pont Co. at the sixth annual Conference on Magnetism.

The new material — a brittle, gray, manganese compound — is unique because it will become magnetic as the temperature rises above a point predetermined by its chemical composition; let its temperature drop below that point and it becomes non-magnetic. By slight changes in composition, that point can be varied over a wide range of temperatures.

What this new knowledge will lead to is not known at this time. The new compound is promoting a better basic understanding of magnetism and may lead to some practical new devices because it has magnetic properties never before known.

Most magnetic materials normally stay magnetic but their magnetism diminishes gradually as temperature increases until it finally disappears (in iron not until 1420°F.).

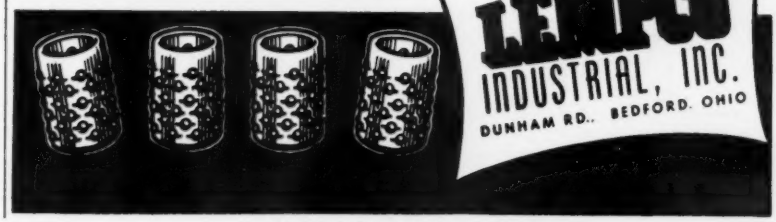
Not so with the new compound. It is attracted to a permanent magnet when its temperature is at or moderately above a certain level. When below, it is not. Scientists can adjust that level as desired over a range of several hundred degrees.

The compound's abrupt magnetic change occurs because the distance between its atoms determines how the inner magnetic forces are lined up. When the distance is less than a specific length, the forces are aligned in a non-magnetic pattern; when it is longer, they swing into a magnetic pattern. The compound contracts and expands as other substances do, and its range of contraction includes the dimension at which the magnetic forces shift. Hence temperature brings about the magnetic change.

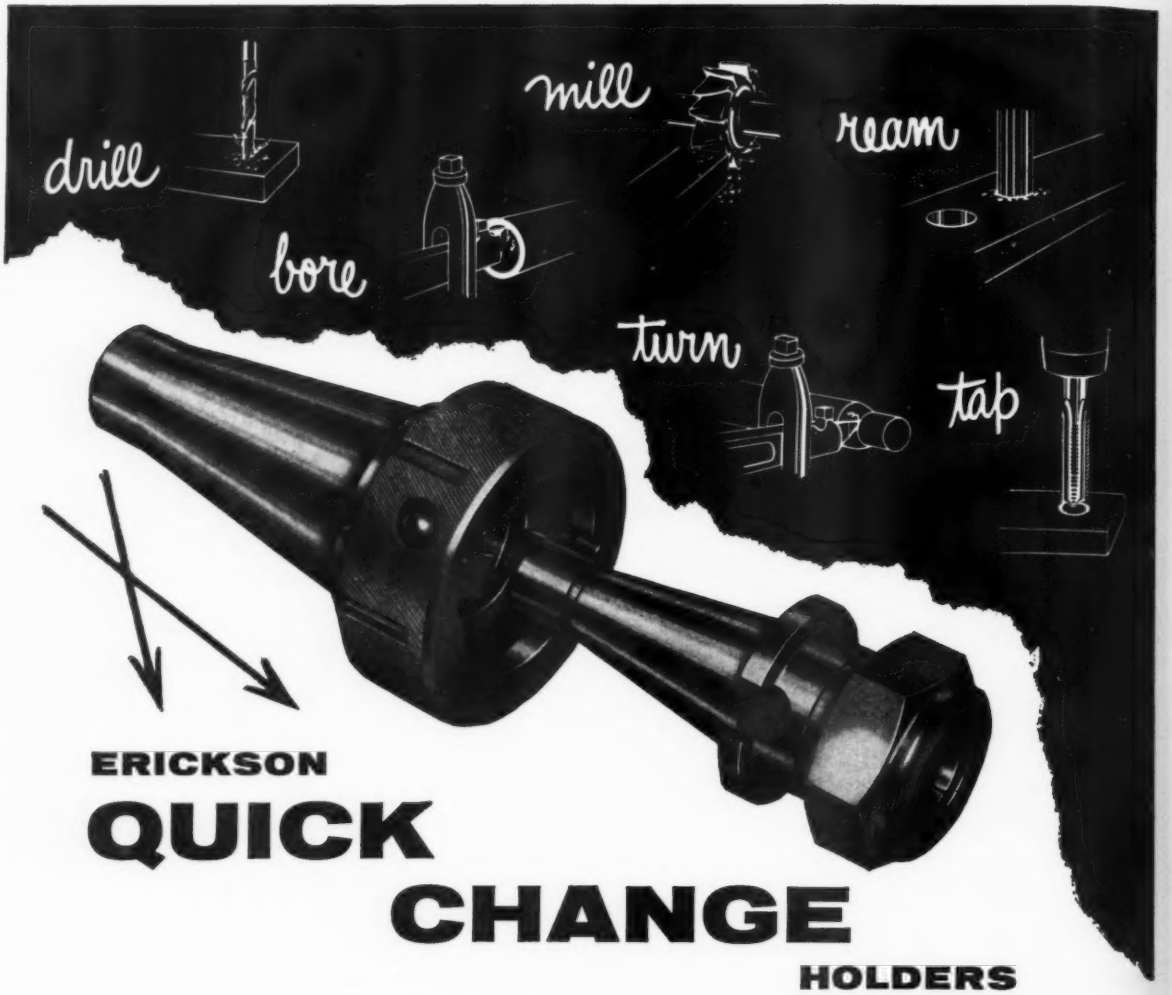
WE GET **ORDERS, TOO!**

Lots of orders, from all over the world . . . orders for our famous BALL-BEARING PRECISION DIE SETS, now with Aluminum Bearing Retainers, for still longer operating life. We get orders, too, for our new M and L Type Die Sets, *all-steel* die sets at the price of cast iron. We're happy. Many of your competitors are happy with their savings in TIME and MONEY when they use Lempco Die Sets.

If you're not already using Lempco Ball-Bearing Die Sets, better write us today for Catalog and Price Lists.



CIRCLE INFORM-A-GRAM KEY NO. 21



ERICKSON

QUICK CHANGE HOLDERS

...for use with your standard MMS tapered tools ...designed for presetting of tools

Now you can use your present standard MMS tapered tools with the *new* Erickson Quick Change Holders. That means you get the double production advantage of Erickson's *high precision coupled with the rapid change feature.*

Several different models comprise the line: Morse taper holders for boring mills and radial drills, milling machine holders that fit standard spindle tapers, turret lathe holders that increase turret lathe tool-holding capacity, straight shank holders with #30 or #40 MMS socket. These holders take Erickson Collet Chuck milling machine adapters in both regular and heavy duty types, end mill adapters, shell and face mill adapters, Morse taper adapters, boring head adapters, and chuck adapters for Jacobs internal taper.

AA-7455

A call or card will bring the Erickson representative on the double. Meantime write for your copy of Catalog G "Erickson Quick Change Holders."

ERICKSON TOOL COMPANY

34354 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • EXPANDING-COLLETS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 22

IT'S NEW... IT'S REVOLUTIONARY...

Stretch Forming and Standard Draw Press Work COMBINED!!

United States Patent No. 2,941,038

- ★ 66-2/3% saving in die cost
- ★ 20% saving in sheet material cost
- ★ Eliminates the hold down ring
- ★ Greater Part Accuracy
- ★ "Oil Canning" eliminated

THE CYRIL BATH COMPANY

33370 AURORA ROAD • SOLON, OHIO

(LOCATED IN THE GREATER CLEVELAND AREA)

Manufacturers of Radial Draw Formers • Dies • Tools
Press Brakes • Tangent Bending Sequence Presses • Press Type Brakes • Special Machines

This new Cyril Bath, Tension Controlled Blank Holder, for shallow draw press operations stretches the metal sheet just prior to press forming. Pre-stretching makes the metal flowable or plastic like and parts are formed with extreme accuracy to the matching dies. Oil canning, wrinkles and trapped air pockets are eliminated. The hold down ring is completely eliminated so that die costs and scrap material is greatly reduced.

For Press Users and potential Press buyers it is a must to investigate this new and outstanding development. Literature is available by return mail or phone.

CIRCLE INFORM-A-GRAM KEY NO. 23

Economy

all-steel die sets

. . . in handy kits!

Wheatley Economy dies offer a double savings to die makers. They save time by being shipped in knock-down form, which enables you to spot and drill the die holder before the pins are installed. They save you money through their low prices and quantity discounts.

Three standard pin lengths — 5", 6" and 7" are offered, together with a choice of 1-1/2" or 2" shanks, at no extra cost. A variety of sizes and pin lengths may be grouped for quantity discount.

"A"	"B"	PRICE
6	4	$19.25
12	4	27.75
6	6	23.00
8	6	26.00
15	6	49.00
8	8	33.00
18	8	59.00
10	10	53.00
15	12	79.00

WRITE OR CALL TODAY FOR FREE LITERATURE

WHEATLEY ECONOMY DIE SETS, INC.

1627 W. FORT ST. • DETROIT 16, MICHIGAN • WO. 1-2878

CIRCLE INFORM-A-GRAM KEY NO. 24

Centrifugal Force Simplifies Tube Casting

Centrifugal force and ceramics have teamed up to allow casting steel tubes with OD's ranging in innumerable variations from 2.25 to 50".

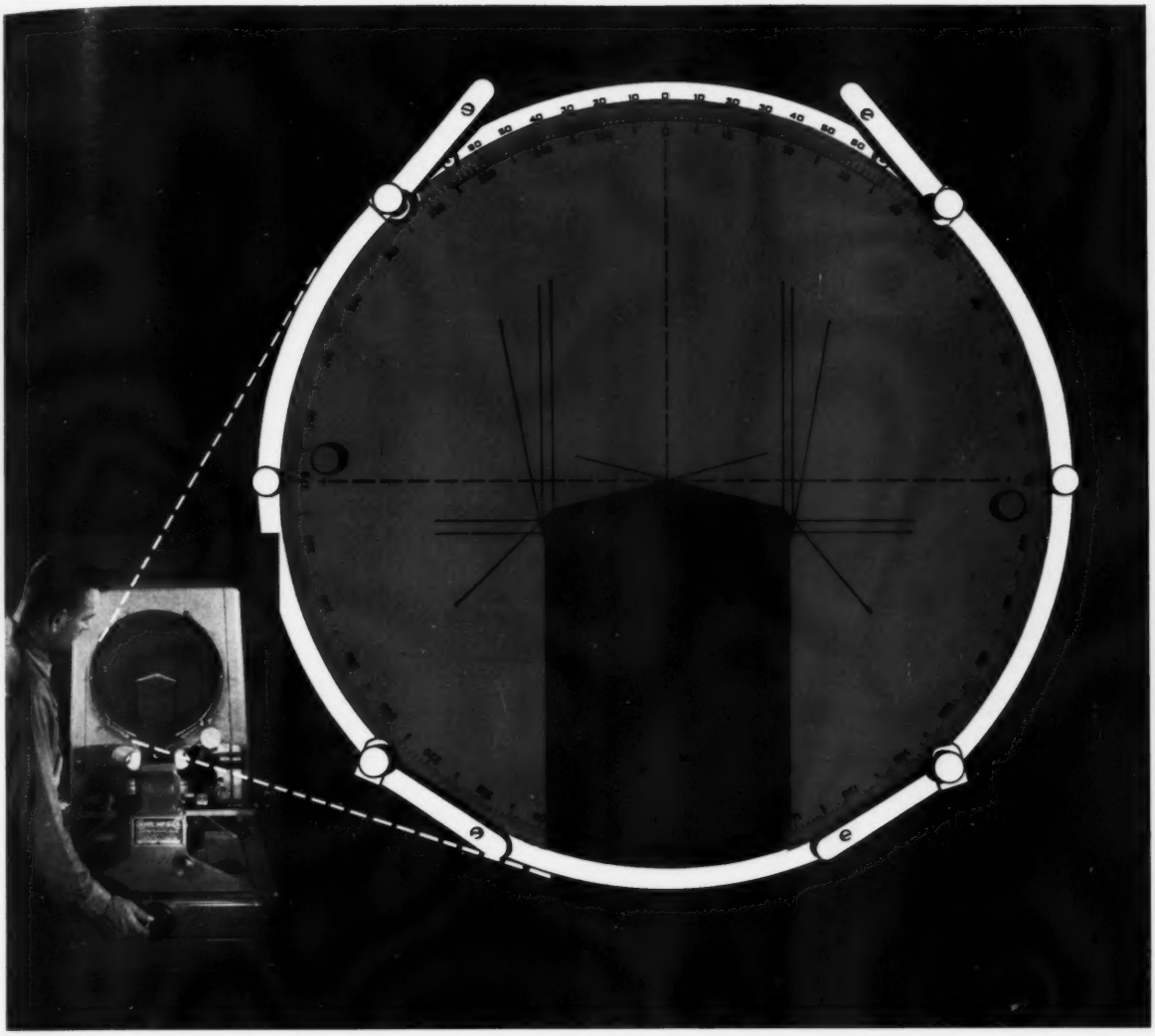
Tube measuring 18.20" OD x 10.70" ID x 20' long is gaged.

Developer American Cast Iron Pipe Co., Birmingham, Ala., calls the technique the Ceram-Spun process, and claims it allows engineers to specify the exact OD and wall thickness for specific requirements.

American's Special Products Div. is producing standard 20" tubing lengths by centrifugally casting molten steel in ceramic-lined metal flasks. Shorter lengths can be obtained by using mold stops. Wall thicknesses from 0.25 to 8" are obtainable. The ceramic lining is produced in much the same manner as the tubes are. The slurry is poured into the rapidly spinning metal flask. Centrifugal force separates water from the denser ceramic particles, and forces finely-divided ceramic particles to the inside surface of the mold.

The mold is then baked, resulting in a dense, hard ceramic lining of uniform diameter. Steel tubes cast in these molds are said to be free of hot tears and cracks associated with older centrifugal casting methods.

Applications for the tubing include normal and high-temperature high pressure piping, hydraulic cylinders, and piston rods, textile rolls, paper rolls, roll-out table rollers.



EVERY RICHARD BROTHERS PRODUCT IS COMPLETELY INSPECTED FOR ACCURACY AND QUALITY

Whether it be punches, dies or related tools, every Richard Brothers product is inspected to conform to our exacting standards and to fulfill our customers' requirements.

Quality-control facilities, precision inspection tools and equipment are used to assure that no flaw escapes detection, every specification is met.

It's your assurance of Richard Brothers reliability — it's your guarantee of interchangeability.

That's one of many reasons why it pays to specify Richard Brothers products for all your metal-piercing needs.

QUALITY

RELIABILITY

INTERCHANGEABILITY

COMPLETE STOCK

RICHARD BROTHERS PUNCH DIVISION

ALLIED PRODUCTS CORPORATION

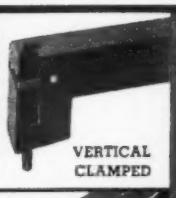
26500 CAPITOL AVENUE • DETROIT 39, MICHIGAN

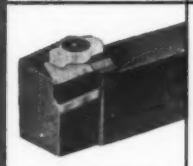
CIRCLE INFORM-A-GRAM KEY NO. 25

. . . ANOTHER TALIDE CASE HISTORY

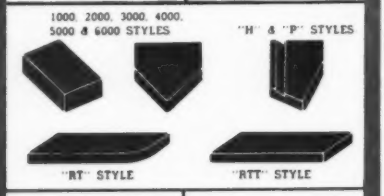
TALIDE TOOLS Produce 50% More at J.I.CASE

BRAZED


VERTICAL CLAMPED


"THROW-AWAY"

HORIZONTAL CLAMPED


1000, 2000, 3000, 4000, 5000 & 6000 STYLES

"H" & "P" STYLES

"RT" STYLE

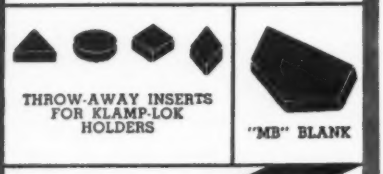
"RTT" STYLE

"STB" STRIPS

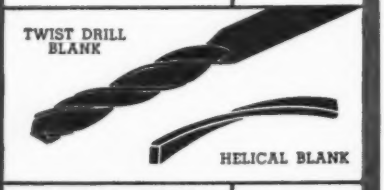
ROD STOCK

KLAMP-LOK TOOLHOLDER INSERTS

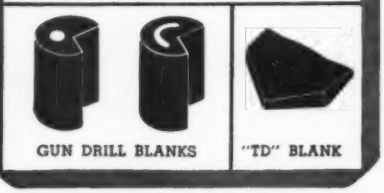
"TR" "SC" "SQ" "DB"


THROW-AWAY INSERTS FOR KLAMP-LOK HOLDERS

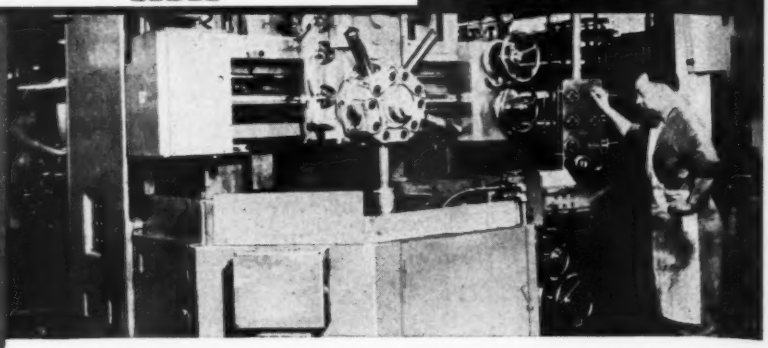
"MB" BLANK


TWIST DRILL BLANK

HELICAL BLANK

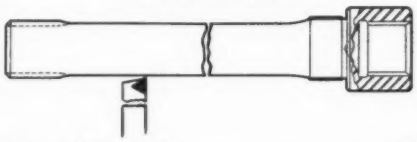

GUN DRILL BLANKS

"TD" BLANK

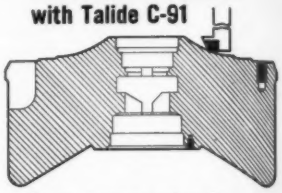


J.I.CASE® Co., Racine, Wisconsin, leading manufacturer of Agricultural and Industrial Equipment, reports Talide Tools give superior performance on both cast iron and steel jobs.

18 Shafts machined with Talide S-92



600 Wheels machined with Talide C-91



Main drive shaft 15/16" dia. x 16-15/32" long	**Part**	Rear tractor wheel 15" dia. x 7-19/32" thick
H.R. A-8640 steel 285-321 Brinell	**Material**	Hi-nickel cast iron SAE111
Turn O.D. of Shaft	**Operation**	Face outer edge of wheel hub, 1/2" wide cut
Carbo-matic	**Machine**	Bullard
#TN-163P3 Talide Disposable insert 1/2" I.C. x 3/16" thick, negative angle, 3/64" corner radii, Grade S-92	**Tools**	#GL-20 brazed tool, off-set style, 1-1/4" x 1-1/4" x 8" shank size, Grade C-91
1/16"	**Depth of Cut**	1/8" to 1/2"
.009	**Feed**	.033
115	**Speed (S.F.M.)**	210
450	**(R.P.M.)**	39
Soluble Oil	**Coolant**	dry
Talide Grade S-92	**Results**	Talide Grade C-91
Machined 18 shafts per grind. Next best premium grade produced only 12 shafts.		Machined 600 wheels per grind compared to 400 for next best premium grade.

HERE'S OUR OFFER!

Our Service Engineers will furnish and test a Talide Tool on any job you designate—free of charge. Write for Catalog 59-G. Metal Carbides Corporation, 6001 Southern Blvd., Youngstown 12, Ohio.

METAL CARBIDES CORPORATION

TALIDE®

YOUNGSTOWN 12, OHIO

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 26

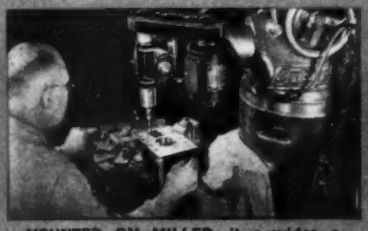
for PRECISION GRINDING

EXTERNAL and INTERNAL

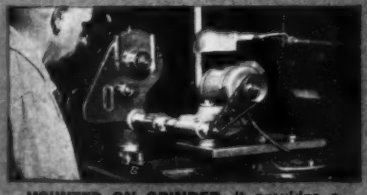
at lower cost

DUMORE®

TOOL POST GRINDERS



MOUNTED ON MILLER, it provides a high-speed precision grinding head for use with small mounted wheels, points or carbide burrs.



MOUNTED ON GRINDER, it provides a simple, efficient method for I.D. grinding.

MOUNTED ON PLANER, it provides a low cost surface grinder. Size of work is only limited by planer size.

Quick, easy mounting on lathes, planers, shapers, millers

With only the small tool investment in a Dumore Precision Grinder you *can* get that production, tool room or maintenance grinding operation done—*right on the basic machine tools you already own!*

Quick, easy mounting gets it on and off your machine tools fast. It converts lathes to cylindrical grinders . . . shapers, planers, millers to surface grinders . . . standard grinders to high-speed internal grinders.

Dumore Grinders have precision-built quills designed to give close tolerance performance at speeds from 4600 to 42,500 RPM. Nine models, from 1/14 to 3 hp, swing ⅛" to 12" diameter wheels. Interchangeable pulley settings provide correct surface speeds for efficient grinding in all wheel sizes. Priced from $93.00 up, FOB Racine. Write for details.

YOU CAN DO MORE WITH **DUMORE** PORTABLE PRECISION METALWORKING TOOLS

THE DUMORE COMPANY • 1304 17th St., Racine, Wisconsin

VERSA MIL • DRILL-N-TAP UNITS • DRILLING UNITS • DRILL HEADS
MICRO-DRILLS • DRILL GRINDERS • PRECISION GRINDERS
HAND GRINDERS • FLEX-SHAFT TOOLS • QUILLS AND ACCESSORIES

SEE YOUR LOCAL DUMORE INDUSTRIAL SUPPLY DISTRIBUTOR FOR ALL THE FACTS

CIRCLE INFORM-A-GRAM KEY NO. 27

These, too, are ®
PORTELVATORS

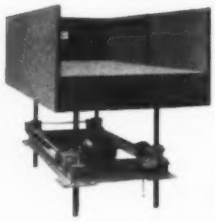
2969-b

PACKLIFTER

Automated!

Built to handle sheet steel. Used for the safe, rapid movement and positioning of packs. Adjustable rocker arm maintains table height automatically. Mechanical limit switch controls maximum and minimum lift. Capacities up to 35 tons.

Big Beulah . . . A "mule" for work! This versatile, sturdy die handling table rolls and turns, lifts and lowers, pushes and pulls. Handles loads up to 5,000 pounds . . . *with ease!*



PACKLIFTER

Manual Control!

Built to handle laminated plastic sheets in a machine feeding operation. Lifts 5 tons — 38" — at a rate of 65" per minute. This one, improved machine output by 200% and reduced cost of the total operation by 800%.

Now you can obtain, *free on request*, a reprint of the magazine article which tells the whole amazing story. Write us today and ask for Reprint No. 2969 b.

For complete data on the Big Beulah ask for FREE News Item No. BB/2969. Also, for literature describing PACKLIFTER and many more special applications of the Portelvator Power Transmission System, specify our FREE Bulletin No. SP/2969.

THE HAMILTON TOOL COMPANY

832 SOUTH NINTH STREET
HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 29

Hard-Surfacing for Longer Life

The secret of longer service life could be hard-surfacing, and the magic elixir could be Colmonoy 6.

This sprayweld powder produces a surface hardness of 56 to 61 R_C, which resists abrasion, corrosion, and galling. Consisting of a nickel base material, containing chromium borides, as well as the usual chromium carbides, Colmonoy has upped service life expectancy of materials treated from 100 to 1700 hours.

The hard-surfacing procedure starts with machining 0.020 undersize to allow for the hard-surface overlay. This surface is then roughened by grit blasting with SAE 18 mesh iron grit at 80-90 psi air pressure. Roughening is required to insure proper mechanical bonding of the sprayweld powder. Oil distribution slots and mounting holes are protected with wood plugs during grit blasting, and all holes are plugged with asbestos packing after grit blasting. White Stop-Off, a flow limiting material, is painted on the center bearing recess and small holes. This substance is simpler than masking and prevents fusion of the Colmonoy material to the base metal.

A two-step welding operation starts with hard-surfacing powder, applied to the roughened surface, and ends with fusion bonding. A sprayweld powder build-up of 0.030 is produced by spraying; parts are then furnace fused in a controlled endothermic atmosphere, requiring five min at 1900° F. Finish grinding leaves a 0.020 hard surface overlay and is performed by the manufacturer, Wall Colmonoy Corp., Detroit, Mich.

Engineering Calculations Simplified

Do you often have to make mathematical conversions such as minutes into decimals of a degree? Or do you need to know quickly the trigonometric functions of a given angle? This and a host of other information is at your fingertips if you order a new booklet offered by Carr Lane Mfg. Co., 4200 Krause Court, St. Louis 19, Mo. Ask the company for the "Handy Multipliers and Trigonometry Tables for Engineers," or circle Inform-A-Gram No. D1.

2969-a

These, too, are PORTELVATORS®

TRAVERSE MOVEMENT

BIG BEULAH

Built in response to the wide-spread desire for lifting and holding devices which incorporate sturdy, ***mechanical*** means of power transmission and ***multiple*** points of support; ***the very features*** which have made "standard" Portelvator the most successful device of its kind!

AUTOMATED

ROLLER TOP

MOTORIZED

PACKLIFTER

It's a

HAMILTON TOOL

use it with confidence!

Read!

For more of the details about these unique materials handling tools, see the ad on the facing page.

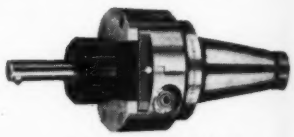
THE HAMILTON TOOL COMPANY

832 SOUTH NINTH STREET
HAMILTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 29

UNIVERSAL
KWIK-SWITCH
TOOL HOLDER
permits
tool changes
in ten seconds!

UNIVERSAL CHUCKS
for every purpose



BORING CHUCK

STANDARD COLLET CHUCKS

FLOATING COLLET CHUCK

Write today for complete catalog of Universal Engineering products.

215

UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 30

YOU CAN BE SURE OF UNIFORM PERFORMANCE FROM O-M CYLINDERS

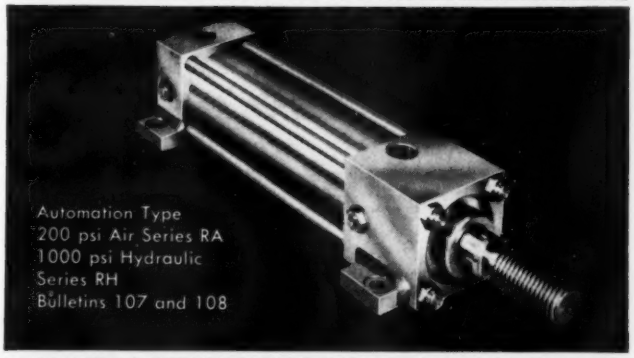
Whether you operate O-M Cylinders, of the same psi rating, bore and stroke, singly or in sequence, each one will exert the same force, handle the same work load, with the same precision. In addition, the direction of each stroke, length of each stroke as well as the time interval between cycles will be controlled to the same high degree of accuracy. As all parts and mounts of O-M Cylinders, of the same capacity, are micro-honed or accurately machined to the same close tolerances, they are interchangeable and precise. Uniform operation is automatic.

O-M Cylinders are available in a complete range of sizes (1½" to 8" bores) with standard or heavy-duty rods. Complete line of interchangeable parts and mounts. Immediate delivery on most sizes.

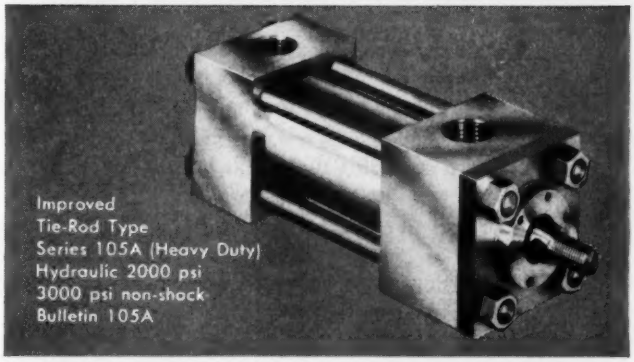
Coupon below will bring our latest bulletins showing construction and dimensional details, engineering drawings, capacity chart and mounting data for each O-M Air and Hydraulic Cylinder.

Mail Coupon Today for Your Copies

Internal Key
Tie-Rodless Type
Series 101A
Air—150 psi—up to
1500 Hydraulic
Fits where others won't
Bulletin 101A



Automation Type
200 psi Air Series RA
1000 psi Hydraulic
Series RH
Bulletins 107 and 108



Improved
Tie-Rod Type
Series 105A (Heavy Duty)
Hydraulic 2000 psi
3000 psi non-shock
Bulletin 105A

ORTMAN-MILLER MACHINE COMPANY
21 143rd Street, Hammond, Indiana

☐ Have representative call

Send Bulletins
☐ 101A ☐ 105A ☐ 107 ☐ 108

NAME_____ POSITION_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 31

Measure the cost of the holes . . .

not the cost of the tools

When you are faced with the problem of cutting the costs of your manufacturing operations, your best solution is to rely on *quality* tooling.

The small savings you may make on the initial purchase price of cutting tools can't possibly offset the extra dollars you lose in *higher cost per hole.*

You'll always save money with quality tools . . . the kind of tools that give you more holes per grind, more holes per tool, less down-time on your machines, faster production and fewer parts rejected.

This adds up to *lower cost per hole.*

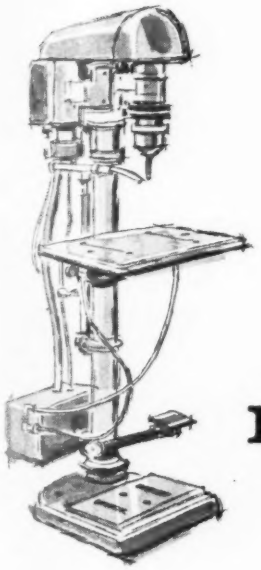
CLEVELAND Tools are designed and manufactured to highest quality standards. In every set-up, on any type of machine, they will help you reduce your costs. This has been proved time and time again in customers' plants.

Moreover, CLEVELAND Quality Tools are sold exclusively through Industrial Supply Distributors, who carry complete stocks for prompt delivery. The steady flow of volume orders from hundreds of distributors enables us to produce the the full line of ◈ Quality Tools in large, economical quantities—with resultant advantages to you.

THE CLEVELAND TWIST DRILL CO.
Cleveland 1, Ohio

QUALITY CUTTING TOOLS • BEST SERVICE THROUGH YOUR LOCAL DISTRIBUTOR

CIRCLE INFORM-A-GRAM KEY NO. 32



How to prevent cutting tool failure

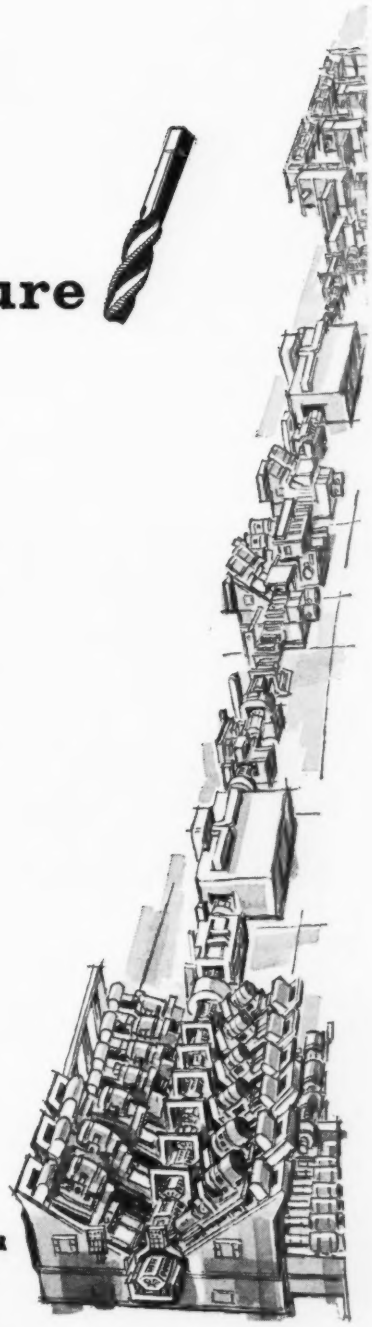
All of your equipment, from a $1,400 tapping machine to a $1,400,000 automobile engine block transfer machine, deserves *quality tooling*.

Tool failure, which often is the result of buying taps on the basis of price alone, causes excessive "down time", smaller output per hour, and higher cost per hole or per piece.

Quality taps, on the other hand, reduce tool failure to a minimum. They are your best assurance of efficient and continuous operation, high output, and lowest cost.

It just doesn't make sense to save a few pennies on the initial price of cutting tools. Lower priced taps are almost always the most expensive in the long run —and often for short runs, too!

Telephone your Industrial Supply Distributor for BAY STATE Quality Taps. He can give you prompt delivery from stock.



BAY STATE TAP & DIE CO.
Mansfield, Mass.
Subsidiary of The Cleveland Twist Drill Co.

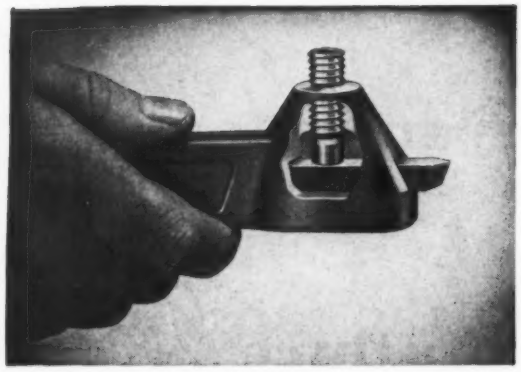
QUALITY BAY STATE CUTTING TOOLS • BEST SERVICE THROUGH YOUR LOCAL DISTRIBUTOR

CIRCLE INFORM-A-GRAM KEY NO. 33

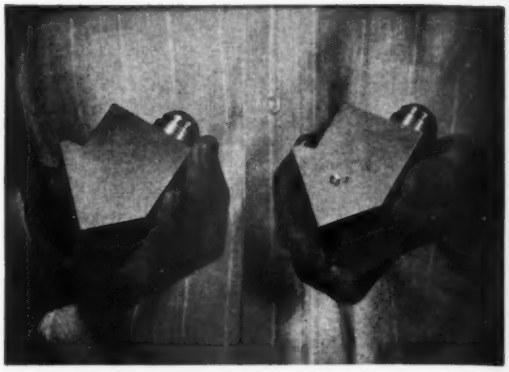
Practical Tooling Tips

NUMBER 1 OF A SERIES

Everyday more and more shops are using standard Vlier Tooling Accessories in place of custom-made devices for both tooling and original equipment applications. The precision construction, product uniformity and quick availability of these simple time-savers have made them tool room favorites. Why don't you start saving from their use?



TO GET GREATER TOOL BIT RIGIDITY replace the tool holder screw with a Vlier Swivel-Pad© Clamp. The large, flat pad face provides many times more clamping area. Bits can be held tighter, reducing chatter and vibration. Small, narrow cut-off blades, multipoint tools, even stub ends can be rigidly held. Unique ball joint construction gives smooth angle adjustment in all directions.



EASY WAY TO STOP MARRING surface of part held in fixture. The part on the left was securely held in the fixture with a Vlier Swivel-Pad© Clamp. The scrapped part on the right was held with an ordinary set screw. With the Vlier Swivel-Pad© Clamp the pad stops at first contact with the part; screw torque is absorbed by a ball, preventing damage to the part. This exclusive ball joint construction also provides adjustment to off-angle surfaces.

SPRING PLUNGERS LET WRENCH DO MULTIPLE DUTY—The compression tool shown above is used to attach connectors to electrical wires. Formerly, each size wire connector required a different size tool. But now, through the use of Vlier Spring Plungers, one tool attaches all sizes of connectors—through the use of changeable jaws. The appropriate jaw for any size connector is easily inserted, accurately positioned, and held in place with a Vlier Spring Plunger.

THE RIGHT AMOUNT OF END PRESSURE AND NO MORE is what this spring plunger application calls for. More than 150 Vlier Spring Plungers are used to hold a plastic sheet in position during the forming operation of a plastic refrigerator door liner. Spring Plungers provide just the right amount of pressure to produce a perfect liner.

New catalog now ready! Send for your copy today.

Insist on Vlier Tooling Specialties... there's still no substitute for quality.

VLIER ENGINEERING CORPORATION

A subsidiary of Barry Controls, Inc.
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CIRCLE INFORM-A-GRAM KEY NO. 34

Sue Perior and Spouse

are undoubtedly the best known "apprentices" in metalworking, thanks to the Superior Die Set people of Milwaukee. They have played leading roles in Superior's advertising for many months. They are photogenic, appealing and, as they "worked" all the aisles in the Detroit ASTME Show, extremely attention-arresting.

Whatever the setting — canoeing, skiing, theater-going — Sue Perior and Spouse get in a gentle reminder of a Superior Die Set feature.

As lifelike as this isn't (who ever heard of a guy and a gal in a canoe worrying about die sets?) once you've seen it, you're not apt to forget!

Admittedly, this advertising technique was a vast departure from the run-of-mill industrial copy, a bit of Sue Perior pioneering, shall we say? We have heard the campaign scoffed at — "incongruous," "incompatible," even "corny." But who's to judge? To paraphrase a bit of Kipling's "If" — If you can increase your sales when all about you are losing theirs — maybe out-of-the-rut advertising can be credited with an assist!

Anyhow, Superior is happy, the kids are happy, the agency is happy, and we're happy!

We find it mighty difficult to scoff at an approximate 15% sales increase, however it may be generated!

E.W.P.

BUCKEYE 58S SERIES AIR SANDER ...REMOVES 50% MORE METAL THAN ANY SANDER IN ITS CLASS!

Now you can increase sanding production without increasing tool cost. Buckeye 58S series Vertical Sanders have higher horsepower, higher torque and lighter weight (one hand operation) than any other sanders in their price class. They are available in governed and non-governed models . . . with speeds ranging from 1500 to 8500 RPM . . . with safety lever or thumb flip throttle . . . 5", 7" and 9" pads . . . all models are muffled and have adjustable dead handle as standard equipment.

write for a FREE TRIAL TODAY!

Remember Buckeye produces the most complete line of abrasive tools in the industry.

Buckeye Tools CORPORATION

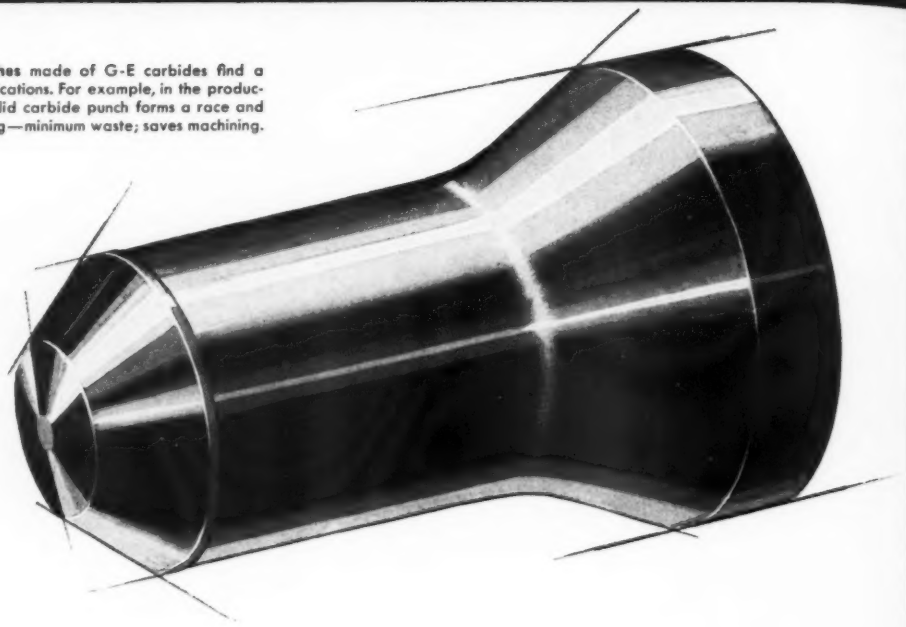
P.O. BOX 966, DAYTON 1, OHIO

Pioneering Power Tools for Industry Since 1920

CIRCLE INFORM-A-GRAM KEY NO. 35

"MOVING METAL" with Carboloy® Cemented Carbides

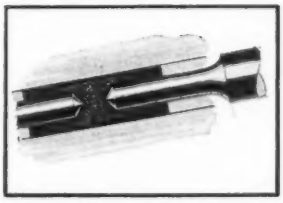
Cold extrusion punches made of G-E carbides find a wide variety of applications. For example, in the production of bearings, a solid carbide punch forms a race and cup from one steel slug—minimum waste; saves machining.



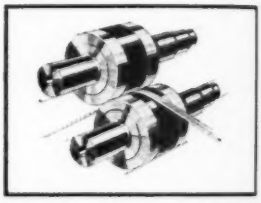
Carboloy cemented carbides save machining time, reduce costs

How efficiently you *"move metal"* from one shape to another depends on the quality, accuracy and uniformity of the carbide you use. General Electric Carboloy carbides for coining and extruding punches, wire-flattening and sheet metal rolls are designed to do the job better, in less time, at lower cost, with less metal waste.

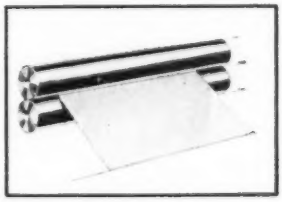
Continuing research by General Electric's experienced metallurgists and technicians results in carbides of highest quality and uniformity—dependability for the job at hand. Call your Carboloy Die Distributor or Die Maker to help you *"move metal"* at lower cost. Or write: *Metallurgical Products Department of General Electric Company, 11111 E. 8 Mile Ave., Detroit 32, Michigan.*



From solid slug to wrist pin—2,000 an hour! Increased production is but one of the advantages when you use extruding and coining punches of Carboloy cemented carbides. You get uniform weight, surface finish, improved strength.



When it comes to wire flattening, rolls of Carboloy cemented carbide outlast steel rolls many times. Smooth, wave-free roll surfaces produce rolled, flat wire products of exceptional quality and finish; consistent uniformity.



You get uniform, more even sheet when you use rolls of Carboloy cemented carbides. Roll structure is uniform throughout; excellent for working stainless steel. Carboloy rolls last longer and do jobs not possible with steel rolls.

CARBOLOY® CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

CIRCLE INFORM-A-GRAM KEY NO. 36

One More Society Is Needed

WITH THE CONTINUED trend toward specialization in the sciences, it becomes more and more difficult to communicate with each other, satisfactorily. How many conversations of late have left you with the feeling of time well spent? We are now at the nodding-grunting stage of conversational art; if we don't improve, soon, we will never make it past TV commercial and the weather talk — very "stimulating." The dullness of this is not the great concern. But the loss of individual opportunity to build upon the knowledge of others is. And it could very well cost us our freedom . . . the value of scientific development to our nation's welfare cannot be over emphasized.

One of man's greatest satisfactions comes from telling others what he knows; if there can be an exchange through understanding, all profit; otherwise, perhaps "total loss" progressively increases.

Another factor: As living tempo speeds up, dividing our already short conversation time, and we take half of what's left to find a common ground on which to exchange ideas, there can be little left from conversation but disappointment.

Perhaps some special committee from within an existing organization could take on the monumental job of establishing (maybe by test) on what level of conversation each technical man is capable of conversing. We could wear lapel pins — more subtle than campaign ribbons — to which our abilities could be "tied." There would be few with exactly the same educational opportunities, but broad category designations could speed up the conversation adjustment of two or more people.

Are we interested enough that we collectively strive to take optimum advantage of our engineering wealth? If we are, we should take every opportunity — and indeed make opportunities — to pass what we know to others on their level, that they may build on it. But are we truthful enough to allow ourselves to be labeled like this for whatever the benefits? Perhaps it is easier to deceive, as to our ability, and in so doing all remain "ignorant" without benefit of what we might have learned from the last conversation and the last, and the last, and . . . .

We strive to preserve our individualism, but what do we profit if each individual keeps his comparatively small store of technology to himself. How much can he learn in his short span? There's too much to know today for any of us to build to any great heights, as individuals. We must help each other to help ourselves. Perhaps one more society with only this "ax to grind" is needed. This "society" could coordinate and concern itself with all phases of engineering information, from a basic standpoint. It could serve a common cause . . . the best use of technical know-how for continued freedom.

William E. Hoffman

Editor

Only EX-CELL-O Contour Projectors* Give You ALL!

CHECK THESE FEATURES!

☐ **LARGEST WORK AREA**—Constant eight inches of work space from lens to focal plane regardless of magnification. Plenty of room for large objects.

☐ **UNSURPASSED ACCURACY**—Famed Kodak Ektar® lenses guarantee reliable measurements with clear *accurate* images over entire screen.

☐ **BRILLIANT SURFACE ILLUMINATION**—Original design, "direct-on" built-in surface illuminator gives extra bright image and *full work clearance* at all magnifications.

☐ **ERECT—UNREVERSED IMAGE**—Correct, normal appearing images at all magnifications, eliminate confusion, simplify operation and save time.

☐ **COATED LENSES AND MIRRORS**—Produce clear sharp images characteristic of Ex-Cell-O Contour Projectors. Have been standard on all models for many years.

☐ **BRIGHT, GLARE-FREE SCREEN**—The "Fresnel" lens is exclusive with Ex-Cell-O, permits operator to see entire screen evenly illuminated from normal position. No "hot spots".

☐ **TRUE MEASURING PRECISION**—All Ex-Cell-O Contour Projectors not only read to tenths—they measure to tenths.

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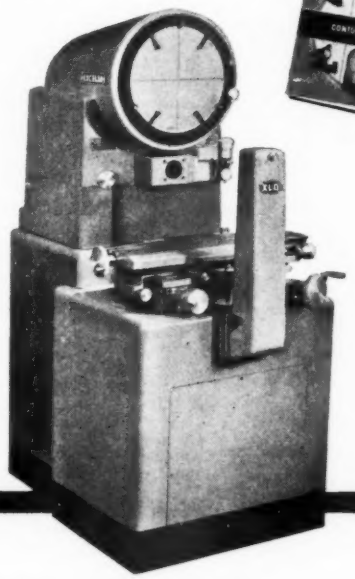

*Manufactured by EX-CELL-O Corporation at Detroit, Mich.

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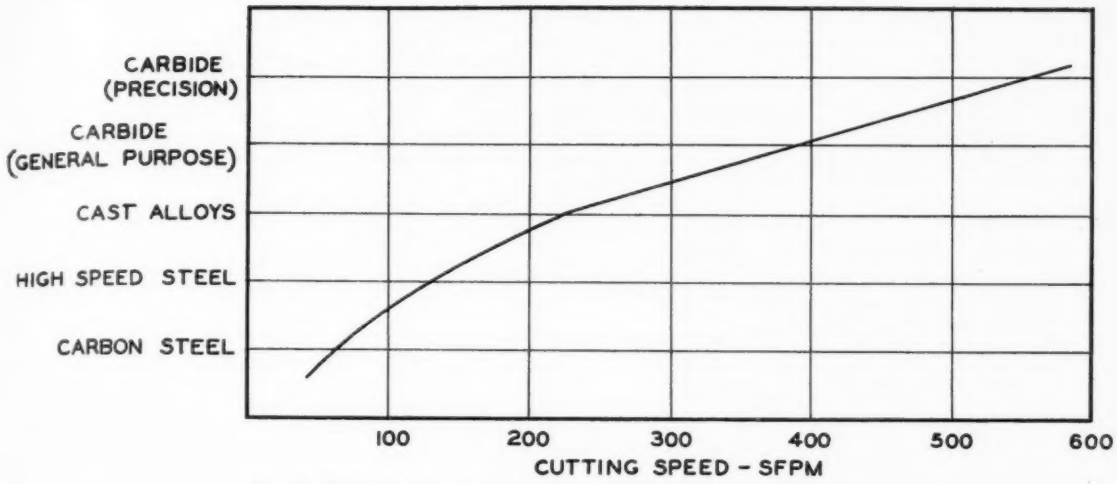


Fig. 1 Typical increase in speed on a representative cut due to tool material.

Are We Getting The Most Out Of Our Carbides?

by William E. Montgomery

Mr. Montgomery is Chief Engineer in the Carbide Sales Division of Firth Sterling Inc., Pittsburgh, Pennsylvania.

THERE IS ONE prime reason why the use of tungsten carbide cutting tools is mandatory in modern metalworking. This reason is that with the carbides it is possible to perform machining operations at a much higher rate of speed than with any cutting material previously used. This is shown in Fig. 1. Nevertheless, it has been typical of most of us in carbide application engineering to stress the importance of tool life. How often we ask the question "How many pieces will it produce?" Too seldom do we ask "How fast can I make it go?"

A brief look at the history of carbide tooling will go far toward explaining this widespread attitude. When carbide cutting tools were new in the early 30's, they were very expensive, and great care had to be exercised to make each of them produce as many pieces as possible. At one time carbide metal cost the consumer as much as $1.00/gm, or $454/lb. So, a compromise on cutting speed and tool life was made based on economic conditions prevalent at the time. The high cost of tool material and the relatively low labor cost had to be considered.

This compromise resulted in the establishment of commonly accepted cutting speeds for various grades of tungsten carbide used under given conditions. These speeds were calculated to be considerably higher than those used with high speed steel tools, but at the same time emphasis was placed on the need to keep the tool in the cut as long as possible.

Today, economic factors controlling the conditions under which carbide cutting tools should best be used have changed radically from those which prevailed 30 yrs ago. The basic carbide metal which then cost $454/lb is now sold at an average price closer to $30/lb.

This radical reduction in material cost is certainly not true of the other factors involved in a determination of the unit cost of parts being produced. Labor costs have multiplied, and are still going up. This has had its effect on ma-

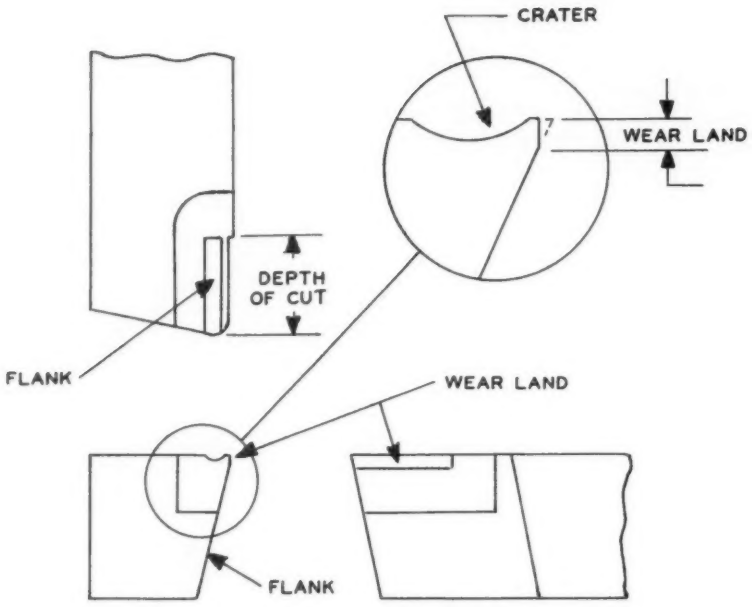


Fig. 2 The two basic types of tool wear: wear land and crater.

terials, machine tools, power, factory overhead and on many other direct and indirect elements of total cost.

It is still necessary to compromise on a relationship of cutting speed to tool life, but the new concept of this relationship should be based on higher cutting speeds than those to which we have been accustomed. When cutting speeds are increased some sacrifice of tool life must be expected.

There are a number of factors in any metal cutting operation that influence tool life, but cutting speed is probably the greatest influence. As will be demonstrated later, it is axiomatic that as speed of cutting increases, tool life decreases.

When most carbide cutting tools were of the brazed variety and expensive labor and grinding wheels had to be used in order to rehabilitate dull tools, low tool life because of higher speed could result in an appreciable increase in cost/unit of work produced.

Today, however, with the widespread use of indexable, disposable inserts, regrinding cost has been practically eliminated. The accurate indexing feature of inserts also drastically reduces the time required for tool changes.

Lower tool life is not the only undesirable by-product of higher operating speed. For instance, with all factors except speed remaining constant, increase in power will be required with an increase in speed. There will also be a slight increase in machine maintenance costs.

In spite of these debit factors, it is quite often true that an increase in cutting speed results in lower total unit cost for parts produced.

As is so often the case, the final answer depends on the conditions pertaining to the specific job at hand. The whole picture should be carefully examined by industrial engineers, or someone with an over-all viewpoint. For example, higher speeds will require frequent tool changes. The effect of this condition, as well as the original cost of the tool, must be determined. The new relationship of traverse time, as well as loading and unloading time, to the complete machining cycle must be reevaluated.

It is possible, with a little effort, to clarify the effect of cutting speed on tool life, and to predict tool life under given conditions.

In setting up a tool life test, it is necessary to keep as many factors as possible under rigid control. In the following discussion, it has been assumed that the flank of the tool is the criterion of tool failure.

Cutting of steel involves another and perhaps equally important phenomenon of tool wear. This is the development of a groove, or crater, in the top face of the cutting tool. The crater is the result of the abrasive action of the continuous chip as it rubs over the tool. The geometry and magnitude of its development, Fig. 2, is much less predictable than flank wear, however. Also, accurate measurement of flank wear is considerably easier and more consistent than in the case of a crater.

The method of determining tool life suggested here involves the plotting of a tool life curve. It has been observed that the rate of increase in the width of the wear land is linear with time in the cut after the first few minutes of cutting time. The length of time, in minutes, in a given cut to develop a wear land of 0.030 width is then generally accepted as the tool life. With all factors except speed remaining constant, the length of time to develop the wear land will be shorter at higher speeds, and longer at lower speeds.

If we plot the tool life in minutes against speed in surface feet per minute (sfpm) on log-log paper, the resulting curve will be a straight line.

It is helpful in establishing such

a curve to make use of the equation developed by Frederick Taylor which shows the relationship of tool life to speed as follows:

$$VT^n = C$$

V = cutting speed in sfpm
T = tool life in minutes
n = exponent describing the slope of the curve
C = cutting speed resulting in a tool life of 1 minute

For most steel cutting operations the value of the exponent n will be approximately 0.16, and this can be used without too much error. For other materials or unusual conditions, this value should be set up by experimentation.

Using this value, 0.16, the Taylor equation could be expressed as

$$VT^{0.16} = C \quad \text{or} \quad V = \frac{C}{T^{0.16}}$$

This equation can then be used to calculate the cutting speed in minutes at any desired tool life to produce a 0.030 wear land. The appropriate value of C can be set up on a given job by running a tool at a high cutting speed to produce a 0.030 wear land in one minute.

Assume that through the trial and error method the C value for a cut on 1112 steel has been found to be 1200 sfpm. Then, assuming that the desired tool life is 60 min, the speed which will develop the 0.030 wear land in this time can be calculated, using $V = \frac{C}{T^{0.16}}$

$$V = \frac{C}{T^{0.16}}$$

$$V = \frac{1200}{60^{0.16}}$$

$\log V = \log 1200 - (\log 60 \times 0.16)$, or
$\log V = 3.07918 - (1.77815 \times 0.16)$, or
$\log V = 2.79468$
$V = 623$ sfpm

Logarithms were used in this calculation to facilitate solving with fractional exponents.

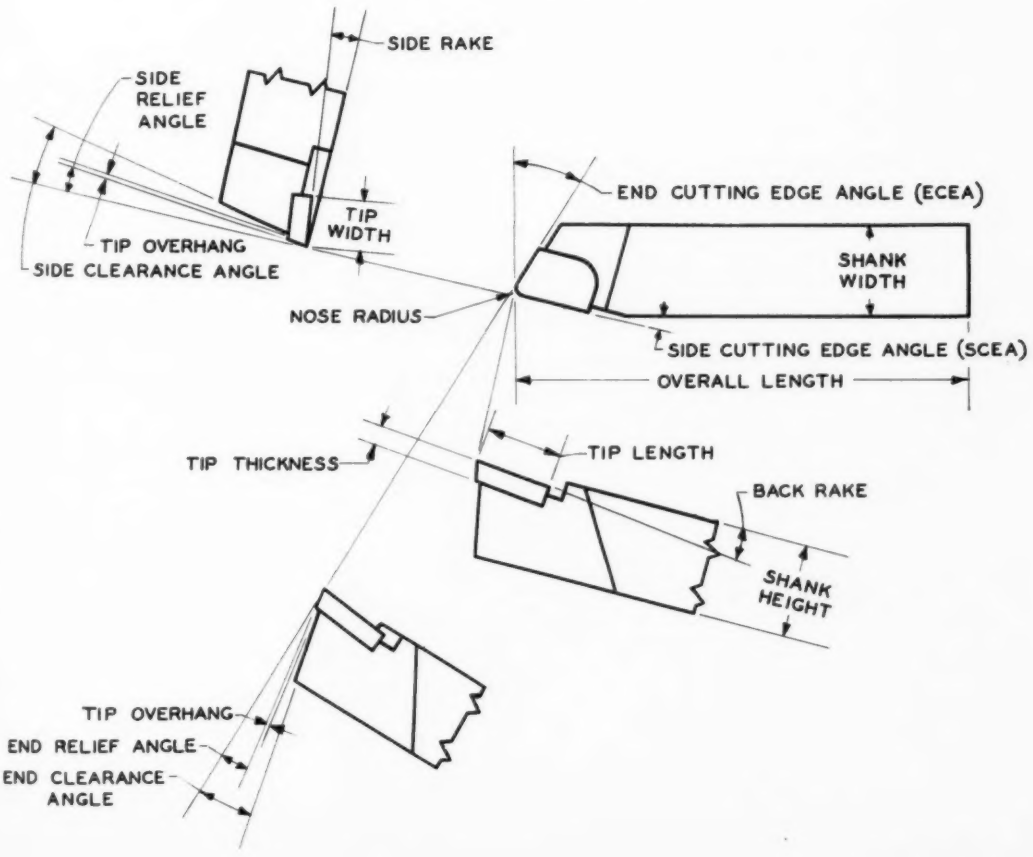
It may be found more convenient by using this equation, or more specifically, the value of 0.16 for n to represent the slope of the curve, to set up a tool life graph for a particular class of operation.

Assume the following conditions:

Material: AISI 4140/265 Bhn
Feed: 0.020/rev.
Depth of Cut: 0.250
Tool Geometry (See Fig. 3): 0° rake, 15° end cutting edge angle, 15° side cutting edge angle, 3/64" nose radius
Grade of Carbide: C-6

By selecting an arbitrary speed, and making one cut sufficiently long to develop a 0.030 wear land, one point on the curve can then be determined. Then the curve can be drawn on log-log paper using the 0.16 ratio for the slope. In the example shown, the central point on the curve was a 60 min

Fig. 3 Carbide tool geometry.



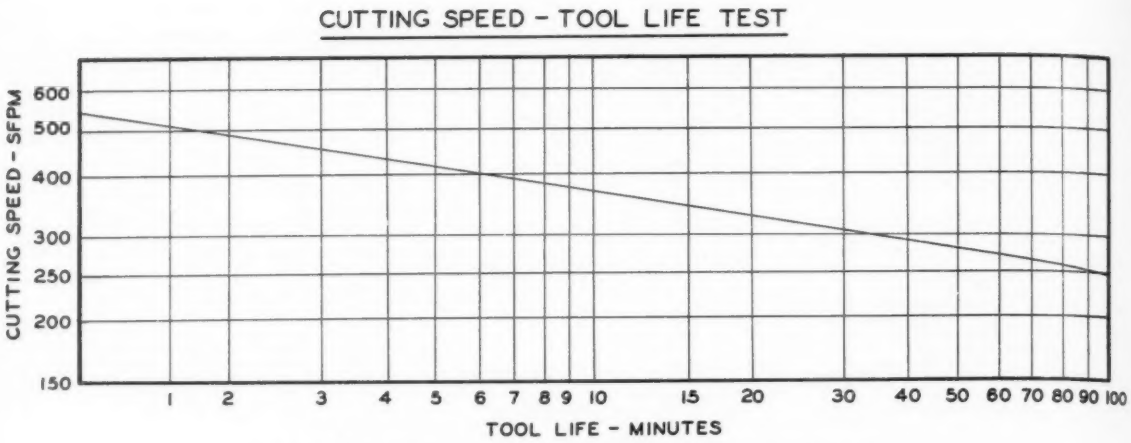


Fig. 4 From this curve the length of time a tool can be expected to operate effectively for any selected speed can be determined.

tool life at 275 sfpm.

From this curve, Fig. 4, it then becomes possible to accurately establish the length of time a tool can be expected to operate effectively for any selected speed.

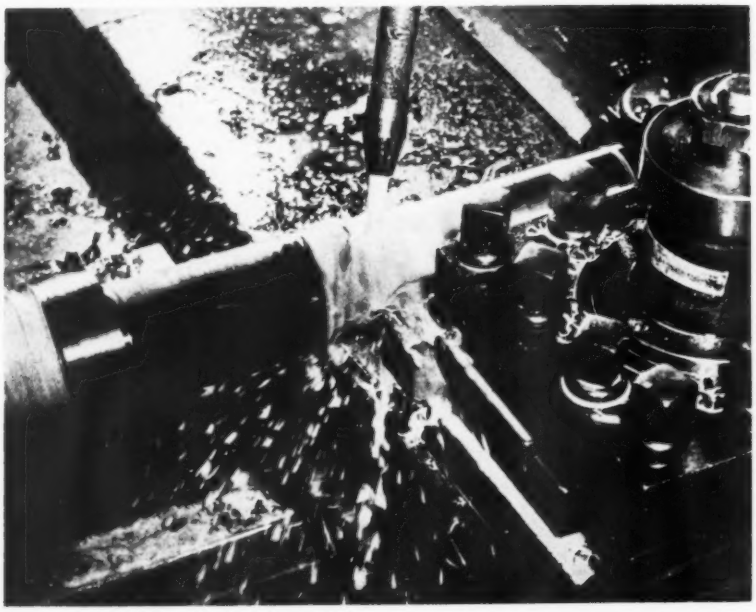
In cases involving unusual cutting conditions, unusual materials or where extreme accuracy is required, it is suggested that two points on the curve be established through trial and error.

Information determined through the use of these calculations or graphs can be used effectively to form concrete opinions as to the worth of increasing cutting speeds as a factor in the establishment of lowest possible production costs. Of course, it is necessary to repeat that there are other factors in this picture, and all must be given careful consideration.

Speed Sfpm	Tool Life Min/Edge	Tool Life Pcs/Edge	Time Per Cut	Prod. Per Day	Inserts Per Day
210	100	45	2.2 Min	175	1
250	37	20	1.87 Min	200	3
300	15	9	1.58 Min	230	7

Part: Forged stud 3" dia x 12" long
Material: AISI 4140/280 Bhn
Operation: Rough turn OD
Feed: 0.020/rev
Depth of Cut: 0.250

Fig. 5 On this job, increasing the sfpm from 210 to 300 increased daily production from 175 to 230.



On one actual job, Fig. 5, the above data was accumulated in a detailed study of the operation.

The production figures are weighted by other factors such as tool indexing time, traverse time, loading and unloading, etc. In spite of the higher consumption of carbide inserts/unit produced, it was concluded that the higher speed would result in a lower total cost of the machining operation. Investigations into the possibility of even higher speeds were conducted, but it seemed that at speeds in excess of 300 sfpm the point of diminishing returns was reached. Unit costs then increased because of a disproportionate relationship of downtime to cutting time, high insert consumption and other factors. However, the new concept of cost savings through increased speed and lower tool life had been established.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Rd., Cleveland 18.

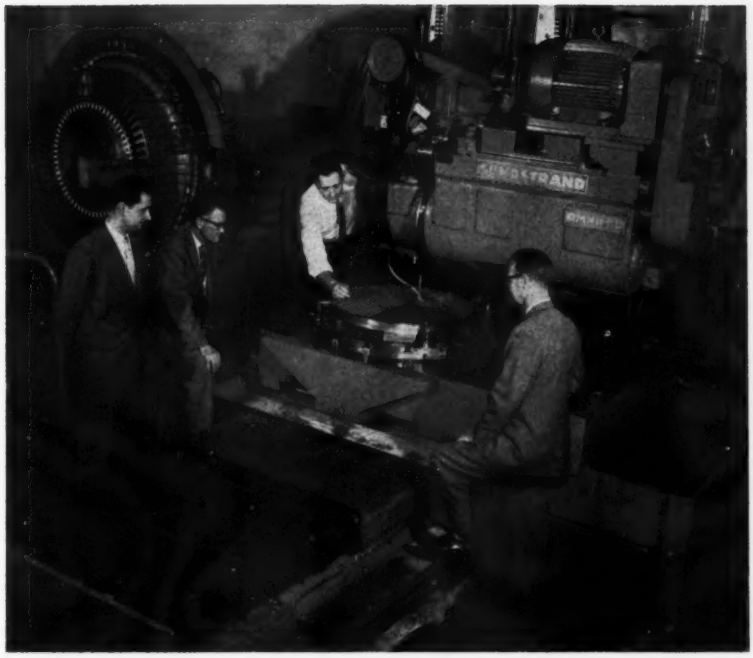


Fig. 1 Nu Mac General Manager Richard Stitt checks holes on heat exchanger part machined by tape controlled Omnimill. Watching are (l to r): Charles Swetel, president of Industrial Enterprise Co.; Carl W. Haydl, product manager and director of control systems for Dage Div. of Thompson Ramo Wooldridge Inc.; Harry M. Blomberg, sales engineer, Sundstrand Machine Tool Co.

Job Shop Specializes In Tape Control

by Charles Weiner
Associate Editor

CONFIDENCE IN tape controlled machining and its time-saving advantages has spurred the development of a new type of specialty shop equipped with a half-million dollars worth of first-of-a-kind numerically controlled machines. The large investment was made by Numerical Machining, Inc. (Nu Mac) for two Sundstrand OM3 Omnimills with 5-axis tape control. Before the first machine was on the floor of the shop, the newly-formed company had orders from aircraft and other firms for a variety of complex parts. This expression of confidence prompted the new Cleveland firm to order the second unit.

The first parts produced have justified this confidence: a three dimensional die produced in 24 hrs compared to about three weeks by conventional methods; a heat exchanger with 572 holes made to a 6-10 rms finish in 56 hrs.

Less than eight months ago Nu Mac came into being as a subsidiary of the Industrial Enterprise Co. In that short time they converted an old building into a modern shop, purchased and installed the first two OM3's ever made by Sundstrand, equipped and staffed an IBM tape preparation center, and are now busy programming and producing parts. Facilities will be complete when a new IBM 1620 computer is installed in May.

The rapid progress made by the young firm is due in large part to the numerical control know-how of General Manager Richard A. Stitt. His eight years of tape control planning and programming in the aircraft industry helped ease many of the initial problems at Nu Mac. Debugging of their new machine-control units was simplified because of this prior experience. Foundations were poured before the first machine was delivered. Tapes were also programmed and punched before machines were available.

Stitt emphasizes that they're not selling time on the numerically controlled machines; they are specializing in machining transmission housings, aircraft gear boxes, pumps, dies, and other precision parts. "If it can be mathematically defined, we can machine it," says Stitt. They program the part directly from a drawing and, using manual or computer techniques, produce a punched paper tape that puts the machine through its paces. Conventionally controlled support-

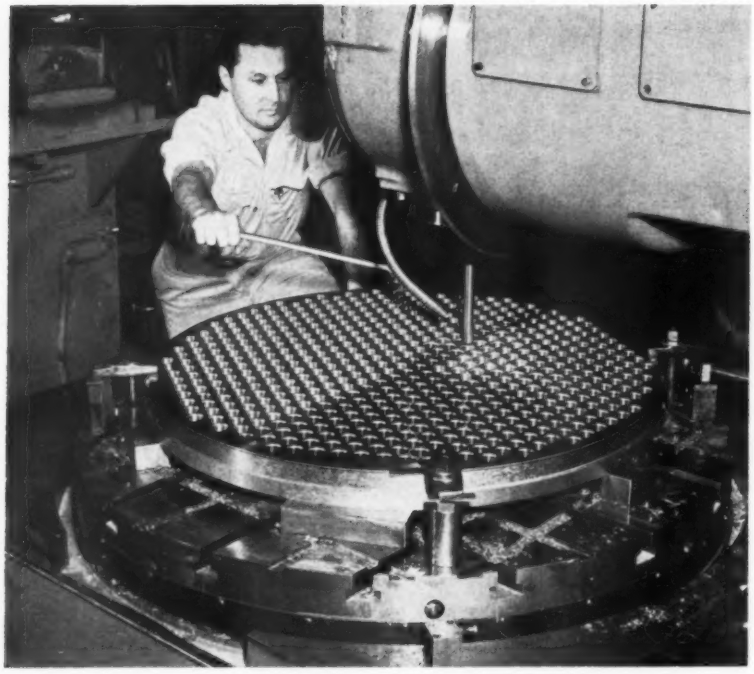


Fig. 2 This stainless steel heat exchanger tube sheet required 572 holes. Part was clamped to rotary table, eliminating fixtures.

ing equipment is available nearby in the Industrial Enterprise shop.

The programming and tape preparation facilities are also used to produce control tapes for point-to-point or continuous path systems used by other companies. This makes it easier for a firm to get into numerical control since they can use taped machines without the need to prepare the tapes.

Nu Mac's combination of facilities really paid off in terms of time and money saved on the heat exchanger tube sheet job mentioned above. The 2″ thick, 38″ dia 430 stainless steel sheet required 572 holes located on a ¼″ triangular pitch. Half of the holes were 1.001 ± 0.002 and half were 1.005 ± 0.002. Operations included: center drill, drill, bore, ream, burnish, undercut two grooves, and groove between the holes on the top surface. The specifications called for a hole finish of only 63 rms, but the completed part checked out between 6 and 10 rms. Total programming time on the part was 18 hrs, and machining time was 38 hrs.

Only two basic tapes were used for the job; one for all hole operations and one for the top grooves. The same basic tapes were used for the other components of the package, which consisted of two 2″ thick tube sheets, two ⅜″ thick titanium facings, and four ⅜″ thick halfplates, all with the same hole pattern. No fixturing was required on any of the parts — they were just clamped to the rotary table.

Another time-saving application was the machining of a three dimensional hydroform die for the Tapco Division of Thompson Ramo Wooldridge. Material was a 14″ dia, 8″ high 4150 steel blank heat treated to R_C32-38. The object was to perform a Keller-type operation on the top surface, generating a 10° angle at 0° radial position constantly changing to 30° at the 90° radial position. A 0.300 radius was generated where the angle intersected the OD of the part. Programming time was 18 hrs, and the part was machined in 5 hrs and 20 min without fixturing. A 2″ ball end mill was used for a single pass. The part came off the machine in Cleveland on a Friday and was in use in Chicago the following Monday. Conventional methods would have involved the making of a complex Keller pattern with sectional templates — a 2 to 3 week job.

These OM3 machines can work on five sides of a part without removing it from the fixture. The head has 360° rotary travel and 4′ vertical travel. Saddle movement is 4′ with its table travelling 3′ along the "X" axis. Table rotation is 360°. The automatic vertical plane tool changer holds 59 tools whose maximum diameter may be 2¾″, but it can also be arranged to handle an 11″ dia milling cutter. To change a tool, the head is indexed to a horizontal position, the changer moves in laterally, removes the tool, indexes, and puts in a new tool. All tool changing

Fig. 3 Tapes are prepared on Nu Mac's IBM equipment which includes key punch, verifier, sorter, and card-to-tape converter. Computer will be installed soon.

and machining cycles are directed by tape.

Each machine is controlled by Thompson Ramo Wooldridge's numerical control system. The all-transistorized solid state system controls the horizontal motions of the saddle and table, vertical motion of the head, and rotary motions of the head and table. Its solid state design takes up little space and allows relatively easy programming. It is designed for continuous path control of the cutting tool, but can also function as a positioning control. Nu Mac says they are using this combination to good advantage.

Carl W. Haydl, product manager and director of control systems for TRW's Dage Div. feels that the machine-control combination at Nu Mac "is probably one of the most sophisticated point-to-point and contouring systems in the world today."

Will Nu Mac's type of operation set a trend? Mr. Haydl thinks so: "Within the next five years the small tool and die shop can't afford to be without numerical control," he said. "Nu Mac's approach will set a pace that will extend across the country . . . ."

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AOA President Calls for Effort

A Meritorius Award presented by the Department of Defense was accepted in the name of the association by Mr. Polk, on the left. Assistant Secretary of Defense Murray Snyder is on the right.

Louis Polk, President of the American Ordnance Assn., has called for a united effort in preparedness so that the nation may never face another sneak-attack. He addressed the association's 42nd Industrial Preparedness Meeting in New York City.

Mr. Polk, Chairman of the Sheffield Corp., Dayton, Ohio, called on government, industry, educators and the American people to insure readiness.

The nation's major task, he said, is not one "of catching up," but of continuing our initiative in research and development — relying on our ability to analyze our true needs, and continuing frank dissemination of information and education of the public on our defense needs and our state of preparedness.

Mr. Polk said that industry must reaffirm its responsibilities to society — not only by working closely with government to stretch the defense dollar, and by stepping up common efforts to fight waste of time and material, but also by taking a leading role in community affairs.

He said education has to increase its present efforts to meet new challenges, and should place "still greater emphasis on applied space-age science — to prepare our youth not only for today, but also for tomorrow."

He called on the American people to "remember that luxuries are not a substitute for strength, nor self-satisfaction a match for determination." He continued that "every American should remember that he cannot afford to become complacent, lest he forget how to become strong — that no man can be good who is not outraged at evil.

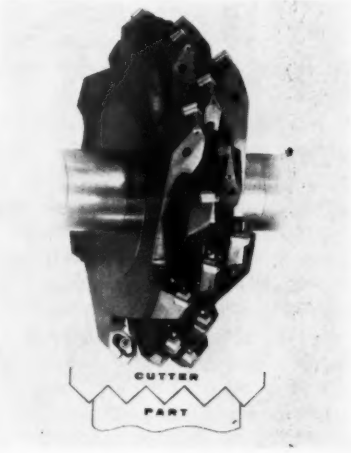
"He should be aware that his very determination to defend his freedom is his best guarantee that he won't have to do so."

Special Cutter Body Gangs Millers

A West Coast oil tool company has saved time and money by being able to machine the jaw contour on oil tool tongs in one pass. They are using a special gang set of five interlocking indexable insert milling cutters made by Wetmore Tool & Engineering Co., Los Angeles, Calif.

The use of indexable carbide insert cutting tips eliminates cutter grinding, and provides four sharp edges/tip. These can be readily indexed by the operator to renew the cutting edges at the machine.

The cutter body is re-usable indefinitely, and the inserts are standard, off-the-shelf items. Precision ground pockets in the cutter body insure tip concentricity at each indexed position, and are protected from damage by removable carbide seat blocks.



A user looks at carbides, and concludes

He Needs A Lot Of Horses For This Big Bite

by Lawrence J. Curran
Assistant Editor

HOW MUCH HORSEPOWER do you need to accommodate the demands of carbide tooling removing 12″ in one pass from the diameter of a heavy cast steel backup roll? Bert Schwartzfager has discovered he needs plenty. He's roll shop superintendent at Ohio Steel Foundry, Lima, Ohio. The firm supplies the big rolls to a number of users, including U.S. Steel Corp., Republic Steel Corp., and Aluminum Co. of America.

When they reach these customers, the rolls carry finishes ranging from 30 rms all the way down to about 4 rms, achieved in a series of roughing, heat-treating, finish-turning and grinding operations.

The roughing work on these big rolls is where Schwartzfager needs the horses to drive the regrindable Carboloy 370 cutters he uses. The rugged machines chosen for the roughing job are produced specifically for turning operations on the kind of rolls Ohio Steel Foundry is machining, according to the roll shop superintendent.

The Lima firm has three of the machines, largest of which develops 250-hp at the spindle. It's a 63″ lathe that handles rolls weighing up to 100 tons, and measuring 30′ between centers. It drives two tools holding 3″ inserts. With a 3″ depth of cut, these tools remove 12″ from a roll's diameter in one pass, at feeds from 0.060 to 0.115 ipr. The carbide inserts average 1½ to 2 hrs between grinds. Two "smaller" lathes at Ohio Steel Foundry are working on 36 and 48″ dia rolls. Hardness of the cast steel before roughing is R_C30-32.

Schwartzfager reports that the 63″ model has been running 5 to 6 days/wk, 24 hrs/day since 1956, with only routine maintenance. It's equipped with heavy-duty SKF roller bearings, which are easy to secure for replacement.

The equipment was purchased after Ohio Steel Foundry representatives visiting Europe saw it perform in an application similar to the one the company is now doing on the huge rolls. The lathes needed no alteration before they swung into production in Lima.

Experimentation with several carbide grades has shaped Schwartzfager's preference for Carboloy's 370 as the best material for this heavy roughing work. After roughing, the rolls are heat-treated, finish-turned, and then ground, sometimes down to the mirror-like 4 rms reading.

Carbides aren't used in either the finish turning or grinding, but are dictated by the taxing speeds, feeds and depth of cut specified in this roughing job. Schwartzfager is pretty certain he's got the machine that can handle this demanding load, and some 4 yrs of continuous, minimum-maintenance roll production with the big lathes is rather convincing evidence that he's correct. end

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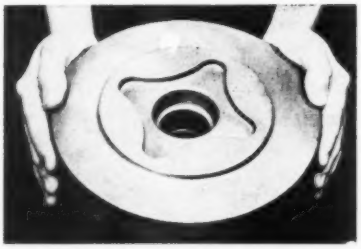
Ceramics a Boon in Casting Process

The Shaw process was introduced to this country by Shaw Process Development Corp., Port Washington, N.Y., a division of British Industries Corp. The process's developers say its advantages stem from an unusual ceramic material used in the production of a Shaw mold. The ceramic fosters a phenomenon called "microcrazing." Minute fissures occur in the ceramic material, allowing gases to escape. This eliminates the porosity, cracks, surface inclusions and other defects often associated with conventional casting processes.



Shaw-cast forging die for producing carbon steel auto wheel guides.

The mold's make-up allows the unique advantage of pouring hot metal into a cold mold. The vented ceramic material is said to "breathe," giving the mold thermal shock resistance and virtually a zero coefficient of expansion.

The Shaw process is said to enable fast, economical production of complex shapes of unlimited sizes using any castable die material suitable for die casting, forging, stamping or plastic molding. It has also been used to produce such tools as broaches, lathe chucks, milling cutters, and end mills.

The Development Corp. says Shaw-licensed tool and die makers have found that conventional hot-work die steels — D-5, H-11, H-13 and H-21, while tough to machine, are well suited to Shaw casting. In many applications, Shaw Process die cavities and cores can be produced for little more than the cost of the raw block of tool steel for equivalent dies.

Fig. 1 In spite of presence of hard titanium carbide particles in tool steel matrix, Ferro-Tic can be machined prior to heat treating. Speeds and feeds are somewhat lower than those for steels.

Machinable Carbides Reduce Downtime & Improve Production

by Stuart F. Tarkan

Mr. Tarkan is Plant Manager, Sintercast Division of Chromalloy Corporation, West Nyack, New York.

AFTER MORE THAN three years of experience with steel-bonded carbides, it is perfectly safe to make this statement: In all proper tooling applications for these unusual materials, service life of from 10 to 20 times that the best grades of tool steels may be expected. And, unlike tungsten or other carbides which require special grinding equipment, you can build your own steel-bonded carbide tools, using conventional machining equipment.

In a nutshell, these are two major advantages of Ferro-Tic C, a sintered composite consisting of hard titanium carbide particles embedded in a matrix of tool steel. These features mean lower die cost per piece, less press downtime, fewer resharpenings, closer parts tolerances throughout the entire run, finer finishes, and no time lost waiting for an outside supplier to deliver the tools.

Fabrication Easy

Ferro-Tic C is produced by powder metallurgy techniques. It consists of very fine, hard titanium particles, embedded in a matrix of tool steel. (It can also be provided in a matrix of stainless steel, where corrosion or high-temperature problems are involved.) After careful blending and compacting, the blanks are sintered, and emerge as a uniform, solid material. Blanks are available as round up to 6″ OD, and up to 2″ long; or as rectangular sections, up to 2⅜″ x 6⅜″ x 1″.

Machining to size, Fig. 1, is handled by standard machine tools,

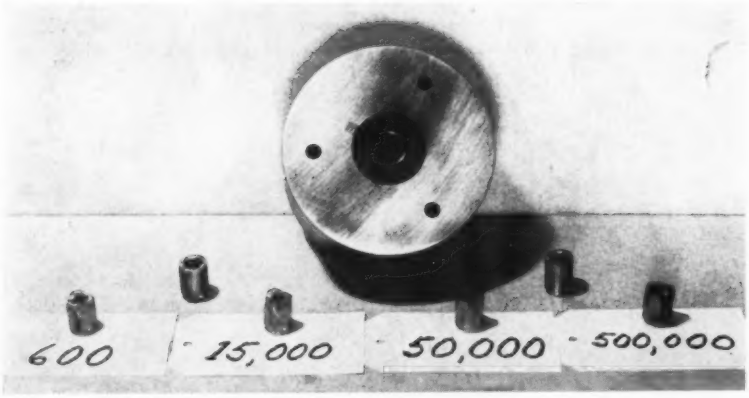


Fig. 2 First or 500,000th. Each bicycle kickstand cam is as smooth as the preceding one. Change in size, after only 5 dressings of the machinable carbide die, is no more than 0.001.

with feeds and speeds generally somewhat slower than those for tool steels. Although the titanium carbide particles are extremely hard, they do not interfere with turning, milling, or other cutting operations because of their very small size. All machining, except tapping, is handled dry.

After machining very close to final size, the tool or die is hardened by oil quenching from 1750° F. Because of the material's unique structure, there is very little movement or size change during hardening. A slightly carburizing, controlled atmosphere is recommended to prevent harmful decarburization of the finished tool. Hardness, after quenching, ranges from R_C68 to R_C71 which can be modified for improved toughness by tempering at 375°F to 425°F for one hour.

Once hardened, steel-bonded carbide tools are ground with silicon carbide wheels, if necessary, using an abundant flow of coolant. Lapping is also possible, and provides an attractive way of finishing close-tolerance inside dimensions.

Steel-bonded carbide sections may be welded, brazed, or cemented to other metals. Because the heat of welding or brazing would soften the carbide, the composite tool is generally heat-treated after assembly.

In this limited space, it is difficult to cover even a small sampling of applications of this unusual tooling material. However, it is safe to say that wherever conventional carbide tools are being used or contemplated, or when even the best tool steel is unsatisfactory, Ferro-Tic C may have certain advantages. It is easily fabricated, requires no special grinding or other metalworking equipment, and offers production capabilities far beyond those of tool steels.

Although the material is higher in cost than tool steels, this additional investment is quickly recouped by a reduction in press downtime, fewer resharpenings, better tolerances, improved product quality, and considerably longer service life.

In addition, Ferro-Tic C is ideal for an experimental situation, where exact tool configurations have not been firmly established. Even if the die or tool has been hardened, it can easily be changed. If only a small amount of material has to be removed, grinding is the easiest way; if a major change is necessary, the tool may be annealed, reworked, then hardened again without any loss in its resistance to impact or abrasion.

In fact, a totally different tool may be fashioned out of one no longer needed. All these potential savings make steel-bonded carbides worth considering for high-speed, high-production runs where continued accuracy is important.

Coining Die Application

Arnold Schwinn & Co. selected Ferro-Tic C for dies used in coining bicycle kickstand cams, Fig. 2. Rough-shaped out of mild steel plate, ⅛" thick, into a cylinder slightly more than 1" long, these cams are cold-coined by a single stroke of the press. The operation reduces the length of the bushing by 3/32", accurately locates and sizes the cam slots, and precisely dimensions the outside diameter.

Formerly, using high-carbon, high-chrome dies, only about 20,000 cams were produced before dies had to be reworked. Grooves on the dies were generally worn so deep that considerable grinding was necessary, with total reworking time ranging from 8 to 15 hrs. After about four or five renewals — equivalent to about 100,000 parts — dies usually had to be scrapped, even though tolerances were in the meantime in-

Fig. 3 Sheet steel, fed into a 9-station progressive die of machinable carbide, is shaped into bicycle crank hanger. At far right, stamped part before being formed into cylinder. Right front, rough crank hanger; left, same bicycle component after piercing of bosses and exact sizing.

creased 7 to 8 thousandths to keep the die usable.

The same die, made from the steel-bonded carbide, produces 100,000 pieces before rework is needed. Further, because much less than 0.001 is removed with each dressing, the 500,000th cam is only about 0.001 larger than the first. And its finish is just as smooth.

Schwinn also uses steel-bonded carbide dies to stamp a complex crank hanger. In a nine-station progressive die setup, Fig. 3, 1/16" steel strip receives four deep-drawn bosses, which are later pierced and accurately reamed to size. Considerable production time has been saved because the dies require fewer dressings.

Motor Lamination Die

One of the toughest materials to work with is electric lamination steel, Fig. 4. It literally chews up die materials in record time, making it difficult to meet production schedules. As shown by on-the-job performance, steel-bonded carbide tools will outlast tool steel by as much as 25 to 1.

Circular laminations are often cut one slot at a time, with a single punch and die set. Ferro-Tic dies, cutting notches at the rate of 400/min, have produced up to 250,000 laminations before sharpening was needed.

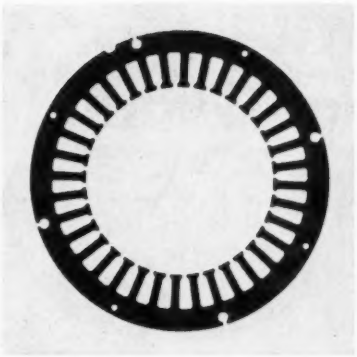


Fig. 4 One of the toughest applications is stamping motor laminations. Extremely abrasive, the metal usually dulls tools very quickly, requires many sharpenings and causes much machine downtime. Steel-bonded carbide used in the application lasts up to 25 times longer than the best grade steel.

Abrasion Resistance

Similar production records have been established in a variety of tooling applications. For instance, nothing could be a more severe test of abrasion resistance than a mold for shaping grinding wheels. Yet, the steel-bonded carbide held up for 20,000 wheels, more than 10 times as long as a high-carbon, high-chrome mold.

Tool Modification

Nipping and curling dies, used by the McKinney Hardware Co. in forming hinges, have proved highly successful. Here, not only did they last longer than dies of other material, but their ability to withstand abrasion even before hardening meant a particular advantage. Annealed dies for a new style of hinge were easily modified to achieve just the right amount of "curl," after a few experimental runs through the press. Once the most satisfactory contours had been found, the dies were hardened for maximum service life. Because of the relatively stable sintered composition, heat-treatment caused no warping and practically no change in dimension in the tool, so that only minor finishing was necessary.

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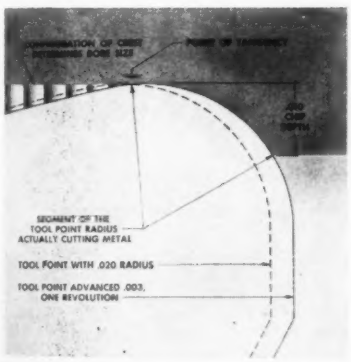
A Bore Takes Place


SEGMENT OF THE TOOL POINT RADIUS ACTUALLY CUTTING METAL
TOOL POINT WITH .020 RADIUS
TOOL POINT ADVANCED .003, ONE REVOLUTION

The point of the cutting tool shown advancing at 0.003/rev. points up two things: 1) why accuracy of the tool point is important in boring — the direct relation of bore size and surface finish to the tool point system, 2) that a preset method of grinding tools means controlling tool edge profile, and faithful accuracy of reproduction. The cross section (left) is 90X larger than actual size. It shows a depth of cut 0.010. Note how the point of tangency between the radius and the end cutting edge is the part of the cutting tool that determines bore size and finish. The Micropoint system is depicted here by courtesy of the De-Vlieg Machine Co., Royal Oak, Michigan.

Polaris Engineering Executive Honored

Westinghouse Electric Corp. has conferred its highest honor for distinguished service by an employee — the Westinghouse Order of Merit — upon Dr. George F. Mechlin, director of advanced systems engineering for Polaris launching and handling, Sunnyvale, Calif.

The award recognized Dr. Mechlin's "outstanding engineering contributions to the development of underwater and surface launching and handling systems for the Polaris missile." It also cited his role in directing a department "which has strengthened the technological leadership of Westinghouse."

The Westinghouse Sunnyvale manufacturing division has the prime Navy contract for Polaris launching and handling equipment.

Dr. Mechlin came to Sunnyvale in 1957 from Pittsburgh, Pa., where he had been manager of the submarine fleet reactors physics subdivision at the Bettis atomic power laboratory.

Dr. Mechlin holds masters and doctors degrees in physics from the University of Pittsburgh, where he was graduated in 1944 with a bachelor of science degree.

. . . from the cover

Cutting Tool Geometry Selector

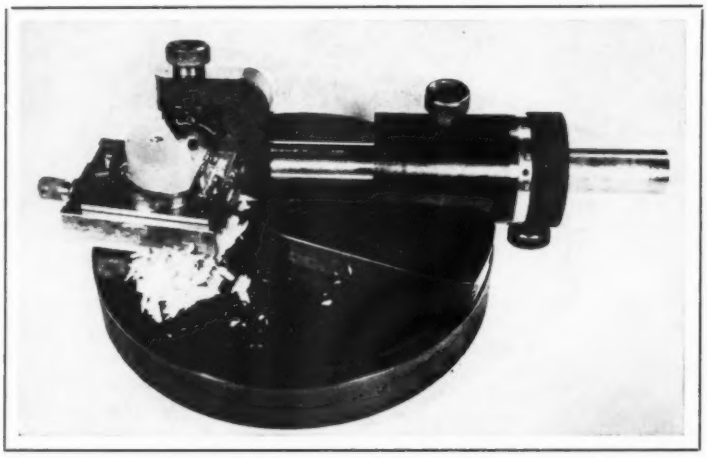


Fig. 1 With this unique fixture, cutting tool geometry can be verified by observing the chips formed from paraffin wax.

FOR THE PURPOSE of establishing the optimum geometry on any cutting tool, this fixture is a first of its kind. Its many adjustments, permit holding the proposed tool tip in an infinite number of positions as it attacks the wax model, Fig. 1. Through its use, Modco Tools, Div. of Valeron Corp., Oak Park, Mich., observes chip flow similar to that which takes place during actual cutting operations—in metal.

By correcting proposed tool angles while observing chip action, insight is gained as to: 1) Avoiding marred workpieces, 2) avoiding chip erosion of cutting tool body, and 3) establishing minimum horsepower requirements.

Principal geometry corrections are for axial rake, radial rake and lead angle, while other factors such as best insert shape are determinable.

Presently, the geometry selector is being used to determine the proper approach to the use of throwaway inserts to replace the expensive one-piece tool shown on the right in Fig. 2. This tool is a special high speed form cutter used by a major metalworking manufacturer. It carries unusually close tolerances to less than 0.0001; maintaining these tolerances is unduly expensive.

Hoping to provide a tool easy to maintain, and yet one that will hold close tolerance, Modco engineers are developing the one shown on the left in Fig. 2.

The length of arc of the geometry selector is a simulation of the radius the cutter will swing — whether it be a milling cutter or a boring tool. Since the tool geometry demand cannot be the same for all radii, it is necessary to experiment with chips at the various radii to achieve similar chip flow.

The research and development department of Modco uses the fixtures, but they will furnish similar

Fig. 2 The special hss form cutter on the right is expensive to make and to maintain. On the left is a replacement using throwaway inserts. The optimum tool geometry was determined by cutting wax with the fixture.

fixtures to others for the purpose of checking out theoretical calculations for new cutter designs.

In use, the thumb screw on the left feeds the wax-holder-slide into the cutting tool fastened to the swing-arm. The swing-arm is actuated by hand power about a fixed point. Its length can be varied.

The cutting tool, a throwaway insert, is attached to the swing-arm in such a way that it can be rotated about its own axis for radial rake correction.

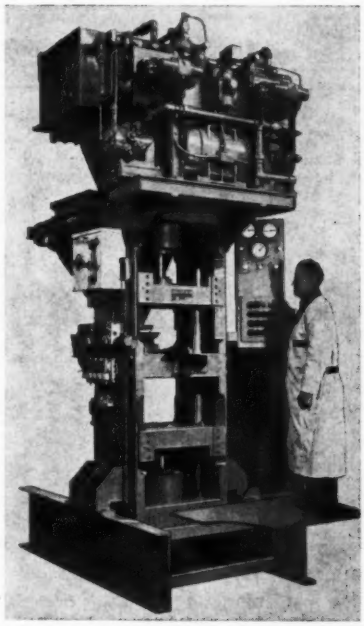
It is interesting that the wax used is ordinary paraffin since chips in this material can be created without breaking up. It should be pointed out however that chip curling is not tested in this fixture. Each metal to be cut has its own chip configuration. The fixture gives a true picture as to direction of chip flow — dependent on tool geometry used.

end

Refractory Press for Long Runs

Simpler compacting and briquetting of refractory materials, abrasives, and powder metals, is the aim of a new self contained, fully automatic press.

The press is the vertical, opposed ram, and automatic cycling type, and is available in sizes from 20 to 750 tons. Among its many long-run design features are continuous oil filtration, water cooling, and automatic lubrication — with spray dwell timer and cycle counter for controlling duration and frequency of lubrication.

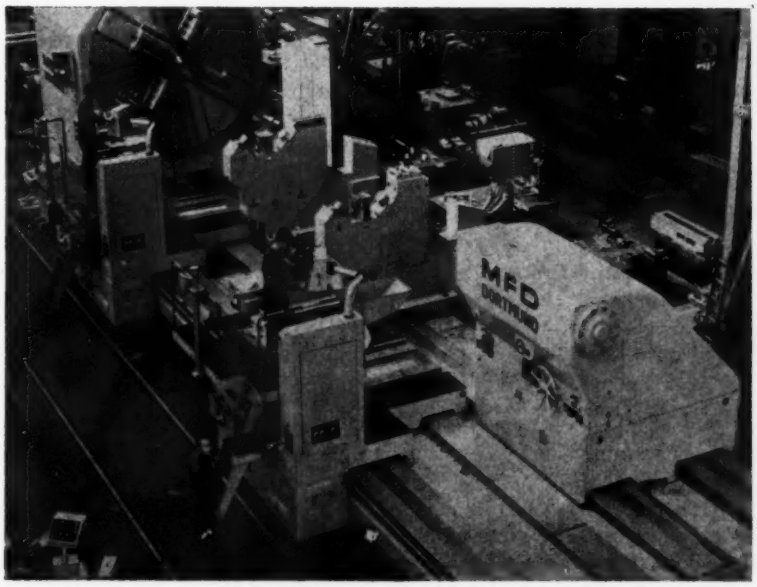


The pumping unit, valving, and the oil tank are located on top of the press to conserve space. A control panel, conveniently located at operator's position, is arranged for jogging, set-up, and fully automatic cycle. Fill and platen limit switches are at floor level. For accuracy in continuous operation an adjustable depth of fill is provided on the bottom ram. All platens allow for quick and simple mounting of versatile tooling. For the sake of space preservation the electrical control panel can be wall mounted.

Automatic loading is performed by the charging box, gate and hopper. These are actuated by hydraulic cylinders and controlled in the press cycle, according to K. R. Wilson, Inc., 212 Mill St., Arcade, N.Y. Inform-A-Gram No. D2.

Lathes for Europe's Largest Plant

Giant lathes will turn immense turbo motors and oversize electric equipment in the manufacture of components for generators, transformers and electric equipment, up to 500,000 KVA, at AG Brown, Boveri's largest electric installation at Birr, Switzerland. MFD lathes were chosen because of their hairline tolerance precision and maximum accuracy to 0.0004". Height from bed to top of face plate is 86"; dia 12'5" and maximum distance between center 42' 5". Turning speeds of from 0.4 to 64.8 rpm may be attained with MFD and allowable workpiece weight may reach a maximum of 330,000 lbs. Information and specifications on the MFD giant lathe available from Transmares Corp., 15 Williams St., New York 5, N.Y., or circle Inform-A-Gram No. D3.



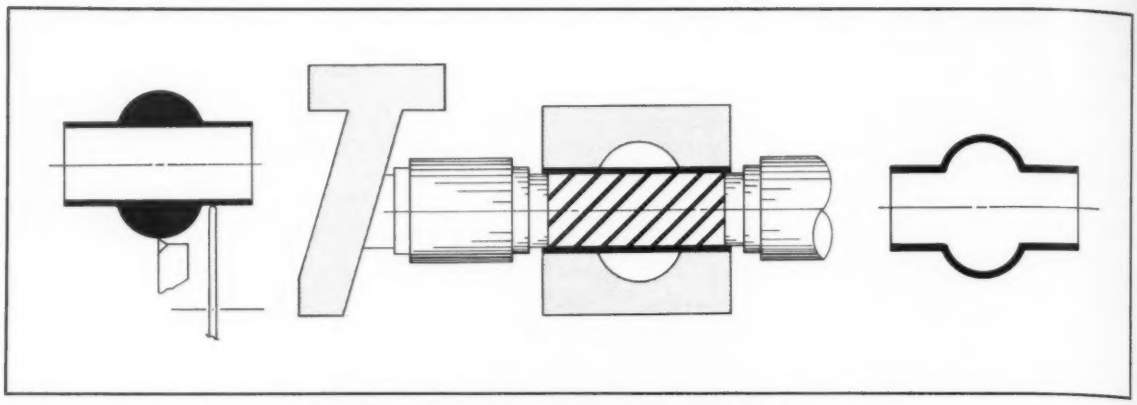


Fig. 1 The ball flex design was planned as a "turning" with a finish grind. Will-O-Hill used a rubber slug to expand it into a die. The slug is hit from both sides in a cam die. Grinding is necessary, but other machining has been completely eliminated for a 21% cost reduction.

Make It For Less, and better ... from tubing

Will-O-Hill Industries, Willoughby, Ohio, has engineers with special talents directed toward making Tubular Stampings. By their unique approach to "stamping" parts out of tubing — in preference to machining — they have come up with many interesting reductions in manufacturing costs.

TUBULAR STAMPING TOLERANCES can be held closer than those of forgings, and stock removed by grinding can be held to a minimum. In fact grinding can, at times, be eliminated. Actually the chip-making involved in many other processes can often be spared through the adoption of this technic.

In Fig. 1, the first example of "stamping" in preference to machining, a ball flex-joint is made. Will-O-Hill engineers exceeded the welded steel tubing manufacturers' recommended expansion by a 100% elongation, yet thinning was held to only 5%.

A machined forging was specified in the first place because it was thought to be stronger and easier to make. This would have been cheaper than machining it from heavy walled tubing, but it would still cost too much.

In preference to machining from a heavy walled tube W-O-H is now stamping this part from a one piece "bulged" tube. They hold tolerances to ±0.002 on the bulge OD. Operations to form the part are few making for a good production rate, while close tolerances account for further savings in reduced grinding time.

Total cost reduction was 21%.

Attempts to expand commercial tubing more than 30% of original diameter usually result in splitting and cracking. Tubular Stampings start with a 1" dia tube to accomplish a 60% diameter expansion. The part is produced free of a forging's roll-in scale, scabs and slivers, and stress is uniformly distributed.

Case History 2

On certain parts it is necessary to arrange "tool marks" in the direction of end-use movement. Tubular Stamping often accomplishes this and other advantages.

On the left in Fig. 2, a precision sleeve for a hydraulic pump is shown with circular tool marks 90° to end-use movement. This is contrary to good processing, and was the result of a circular honing operation formerly used to size and finish these parts.

Specifications ran like this: 1) A ±0.0003 tolerance on the OD for the full 1⅛" length, 2) +0° −0′ and −0° −10′ on the angle, 3) ends must lie in same plane with 0.0008,

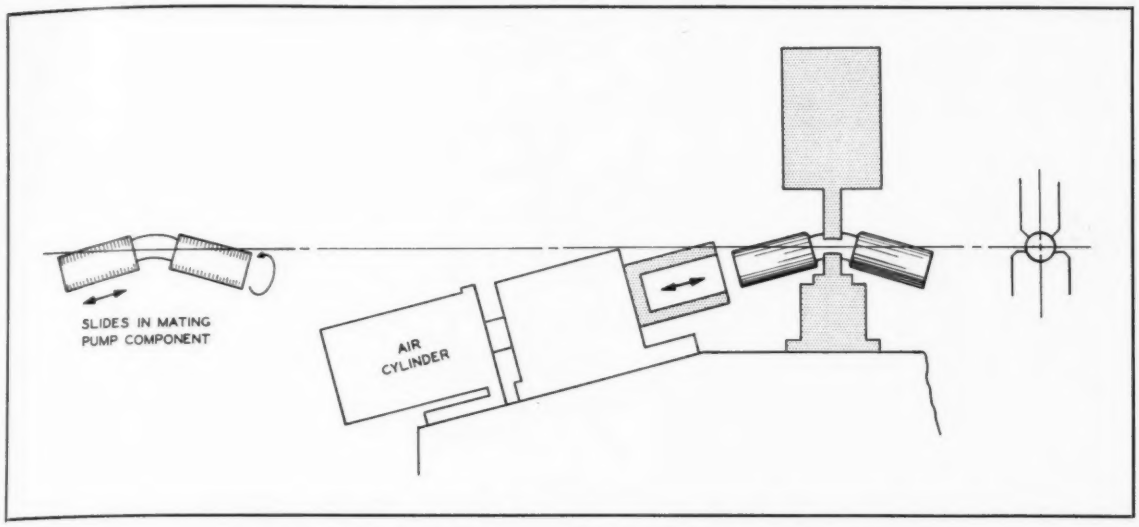


Fig. 2 During the original processing of this hydraulic pump sleeve, circular honing left tool marks that caused excessive wear during use. One step of the Tubular Stamping process now in use is shown here. The burnishing action for size and finish is in the direction of its movement in the pump.

4) 16 rms finish, 5) almost no distortion after heat-treat, and 6) 25,000 parts a day. Tubular Stamping met this challenge and improved the part in doing it.

They started with a 7/16 OD welded steel tubing which was cut off, chamfered and deburred. Next the center was roll deformed in three steps. Then the sleeve was bent in a hinge die. Final sizing and finish was done in a special four station machine; a typical station is seen in Fig. 2. Both ends of the piece are worked simultaneously, completing the job in 1.3 sec.

Since burnishing is done in the direction of final use, the part is superior to previously honed parts. More than 5,000,000 have been processed as explained above with a 42% saving/part.

Case History 3

On a stainless venture a 62% saving was planned into the switch from previous processing.

A venturi should pass a fluid medium with as little turbulence as possible, but still the final performance is at the mercy of the manufacturer and his skill or lack of it. This part was previously cast and then machined. Optimum performance was never reached since the casting has porosity and tool marks.

W-O-H uses welded type 316 stainless tubing which is swaged to the nut shown in Fig. 3. It is then burnished to precision tolerances for better life. A burnished surface is better since it retards cavitation; a cast-machined sur-

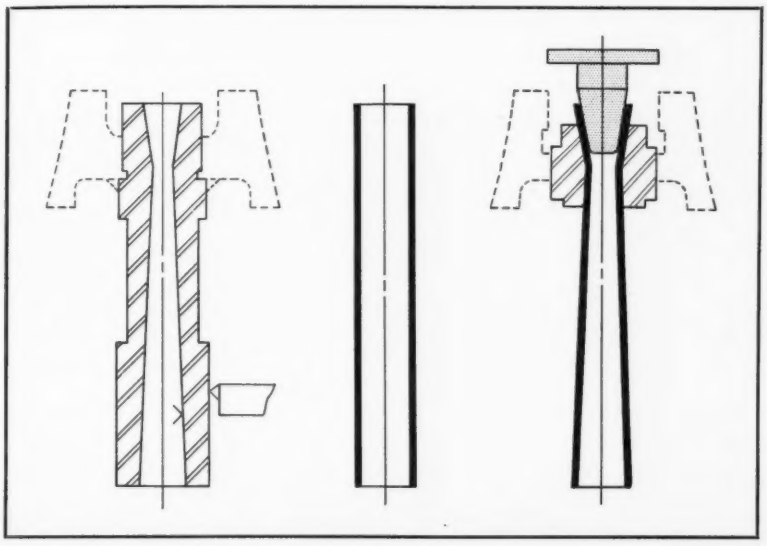


Fig. 3 On the left is a sectioned, cast-machined venturi which was later changed to a Tubular Stamping for a 62% saving. It was done by using ordinary stainless tubing. It is first swaged, the nut is added, and then the punch secures it, at the same time creating the other end of the nozzle.

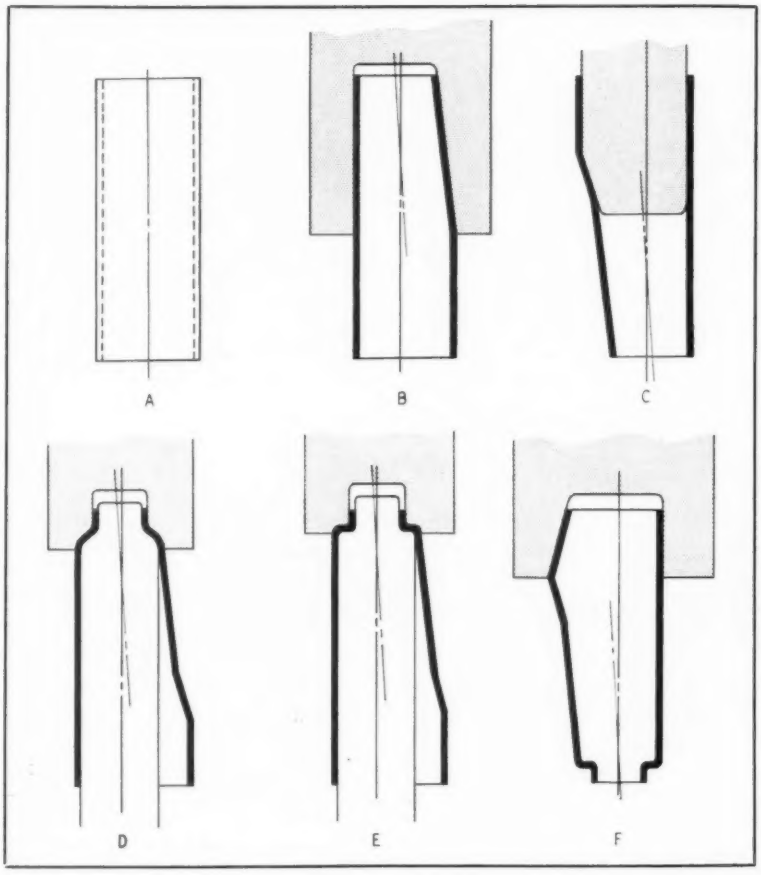


Fig. 4 All punch press operations are not shown; only five views are used to show the major steps in the transition from the tube. A number of similar "hits" were used at "B" and at "C" to gain necessary reduction or expansion. The work at "D" and "E" are more straightforward, while at "F" a number of dies were necessary.

face encourages it.

Savings were substantial enough to amortize tooling cost in fewer than 500 pieces, but over and above this the part was so improved that the customer had to revise all friction loss constants, since resistance coefficients were greatly reduced by the better finish.

Case History 4

The "pregnant bulge" job, is what W-O-H calls the air spring piston shown processed in Fig. 4. The problem was to mass produce a shape that defied any practical fabrication or manufacturing approach.

Many were asked, "How can we make it? It doesn't lend itself to casting, forging or a reasonable machining attack." The one answer was to make it as a Tubular Stamping.

The 2° —20′ centerline-deviation from its other centerlines created a problem, along with the fact that reentry is impossible. A chip making process would require intricate external tooling, and even though they speak of the last operation as creating the bulge, it is a critical bulge. Although "bulge" connotes a loose tolerance, this is not the case. The bulge in this case controls volume of air flowing into or out of a rubber bag insert. Its volume predicts characteristics of the air spring.

W-O-H tackled it, and what started out as an impossible to produce part ended up as just another press formed part.

Case History 5

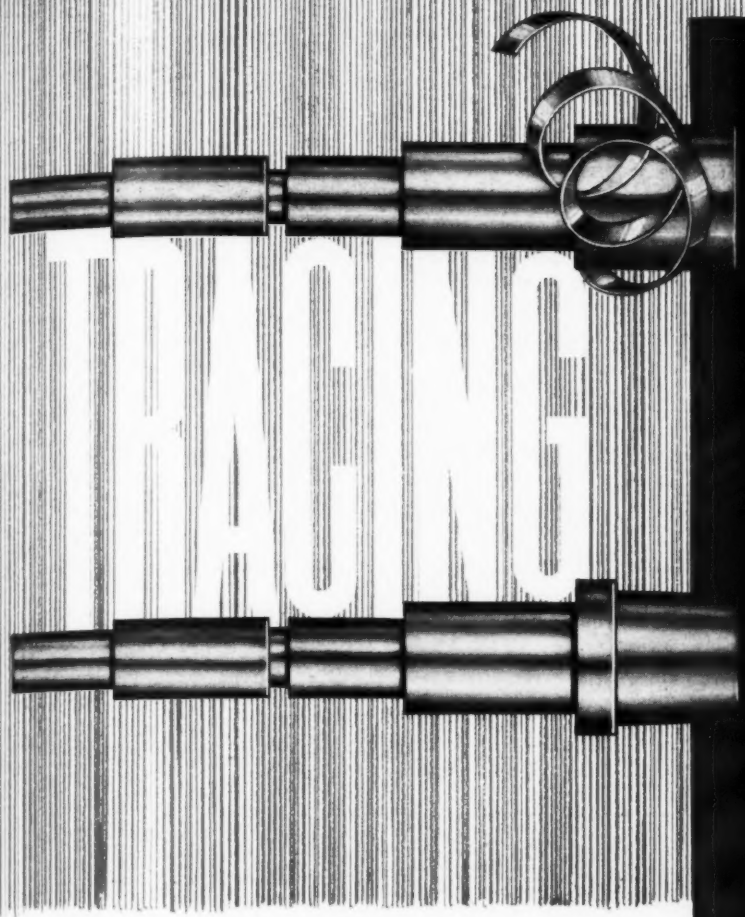
Like most stamping companies, W-O-H has "trophies." There's a wall full of examples of handiwork which do not appear to be stampings — and yet they are.

Another recent trophy is the precision aluminum shell shown in Fig. 5. This could have been processed by other methods, but it was doubtful if uniformity and consistent results would be as good as with Tubular Stamping.

Being of aluminum, it was necessary to handle this part with great care. A gentle squeeze would distort the 0.035 wall beyond the OD tolerance of ±0.0015, and the out of round requirement of ±0.010. Additional perpendicular tolerances of 0.010 throughout, with tolerances at one section reverting to 0.005, made this a very touchy job.

The job was first thought to be best as a "spinning," but with the thin walls and the 3″ dia, dimensional control became difficult. Great care had to be exercised to insure an even amount of metal flow throughout the length. If not, stresses would be set up from section to section tending to distort it when it was removed from the mandrel. As a Tubular Stamping, there was an immediate 25% saving with no sacrifice in quality. In spite of the fact that tubing costs more than flat stock. Production is good, scrap is at a minimum, and the rejection rate is low.

The added inverted detent oper-



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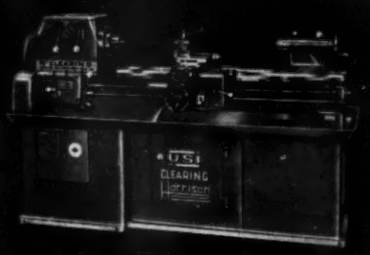

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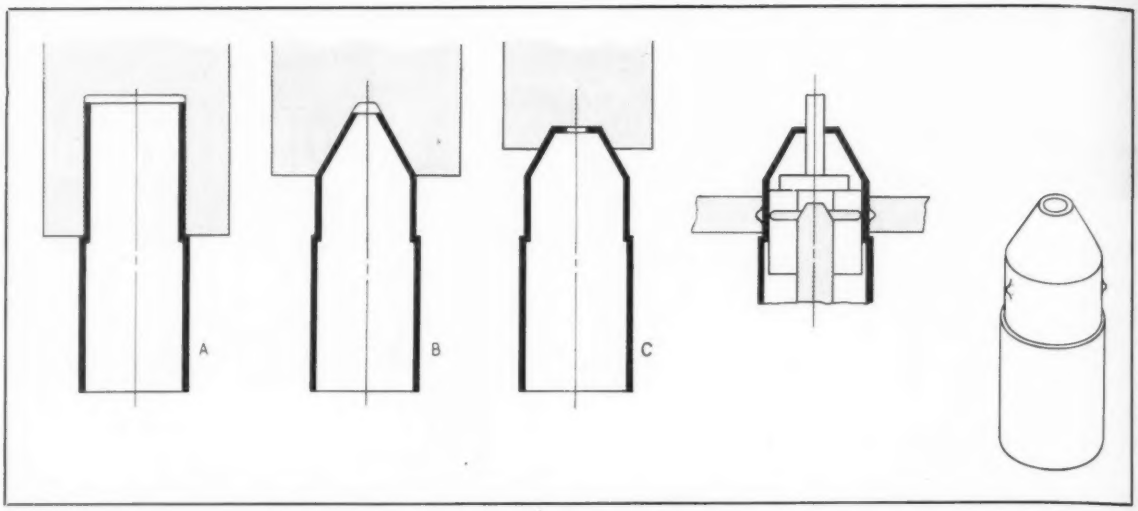


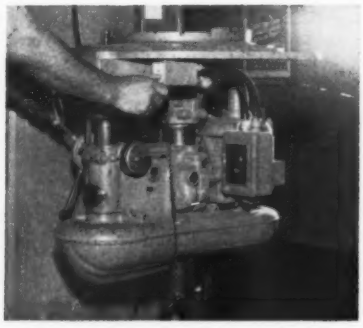
ation is done without relaxing tolerances or distortion. Many compelling advantages have made this a natural for Tubular Stamping.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Rd., Cleveland 18.

Fig. 5 This thin walled aluminum part seemed to be a natural for spinning, but the Tubular Stamping approach has proven superior by allowing a 25% saving.

As in other case histories, all steps used in making this part are not shown. At "A" one of the dies necessary for the part-step is stylized. At "B" the cone is formed in successive dies. The cone-end is further formed at "C". The sectioned mechanism shows the principle used to create detents. This is done in an ingenious fixture using air cylinders for pressure and fixture movements.

Rotary Table On Upside-Down Drill



A rotary table mounted over a standard 17″ Delta drill press that's inverted on its column makes it easy for the operator to position a large aircraft engine mounting plate for back spotfacing 24 bolt holes. United Airlines' Engineering and Maintenance Base in San Francisco also turned the drill press upside down to enable the operator to get close to the work. Its column was shortened so the table could be mounted without interference.

Rifle Parts Processed Here

Intricate operations on a small workpiece are this machine's "meat." Six units with seven spindles drill, mill, counterbore, countersink, spotface and ream gas cylinder plugs for rifles — 200/hr. A 24″ index table holds seven work fixtures with manual clamping and unclamping.

Three vertical units step drill, counterbore and step ream a cross hole, holding the location within the required tolerance of 0.003 from the shoulder. An underneath head chamfers the bottom. Two more units have heads to mill slots, and the last station spotfaces one end of the plugs. Get complete details from Kingsbury Machine Tool Corp., Keene, N. H., or circle Inform-A-Gram No. D4.

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CIRCLE INFORM-A-GRAM KEY NO. 57

Carbides, Ultrasonics Tackle a Cutting Problem

by Lawrence J. Curran
Assistant Editor

"ULTRASONIC METHODS are today's best for cutting non-conductive materials." That's the opinion of Wilbur A. Forshey, head of the instrument fabrication section at Lewis Research Center, National Aeronautics and Space Administration.

Forshey's emphasis is on the word "today." He's aware that in his business, today's methods might be tomorrow's museum curiosities. His machine shop men at the Cleveland facility are doing a lot of work with non-conductive materials — quartz, ceramics, Pyrex and plate glass. These materials will eventually find their way into the ion engines that will propel a future space probe from one of NASA's launching sites.

They've got a target date, an ultrasonic impact grinder to work with, and a boron carbide abrasive slurry to do the actual cutting. Now all they need is a lot of patience — the kind required in a field where little prior knowledge exists.

They must always be aware that months of study and production time in the machine shop might lead to a fizzle on the launching pad when the critical moment arrives. "But if we learn something, even in failing, the effort hasn't been wasted," says Forshey.

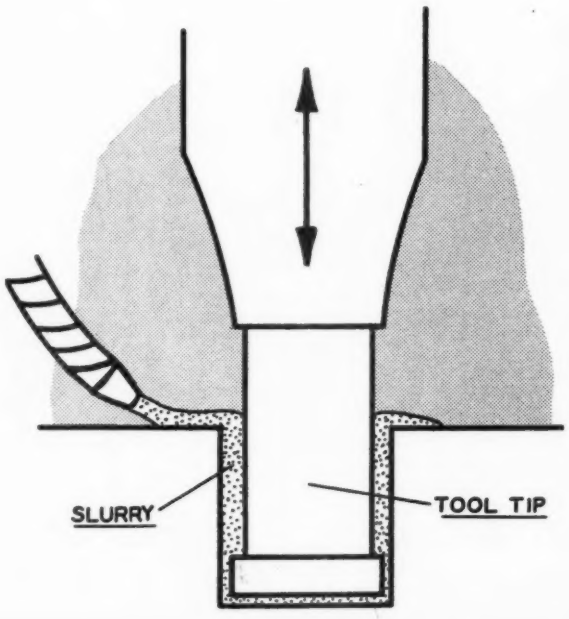
The glass materials being machined ultrasonically will serve as insulators in the electrical engines. Many of them require holes to accommodate instrumentation lead wires. Some of these holes can be no larger than 0.020 dia, and have to be "drilled" through ⅛ to 3/16" thicknesses of quartz. The boron carbide slurry is driven against the work at frequencies up to 25,000 cps by the vibrating tool steel tool, abrading the quartz the same way a grinding wheel wears a workpiece.

Tool Wear a Problem

Unfortunately, it also abrades tool tips, even though there's no contact between them and the work. The carbide slurry either floods the workpiece under a solid tool, or is pumped through a hollow tool. Once the hole begins to be sunk, the abrasive's backing out of the hole wears a tapered form on the tool tip. Forshey estimates that one part of tool bit is worn away for every 25 parts of work material.

This isn't fast work, Forshey emphasizes. It takes them about 30 min to get through a quartz button about 3/16" thick. They've chosen an ultrasonic impact tool, with a water-cooled transducer, after getting discouraging results from contracting the work outside the shop.

Forshey's operators quickly learned that patience had to be the by-word. Fractures occurred in both the work and the tool tips until they learned to tune the frequency of the machine to the material being worked. Forshey explains that the ultrasonic vibrations sometimes relieved the stresses that existed in some of the glass they were using, causing it to



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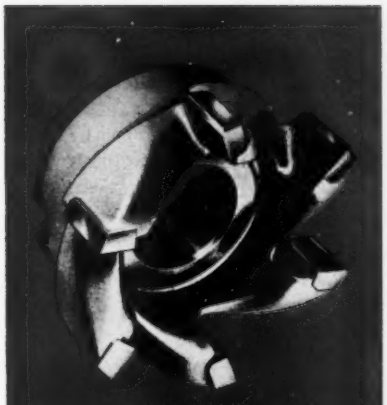

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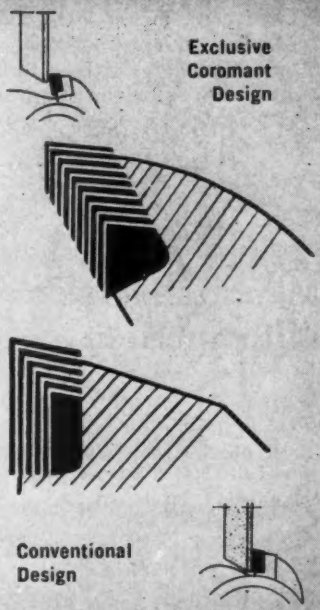

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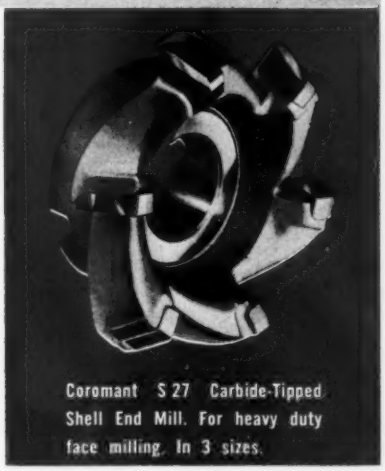

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fracture. They experienced tool fracture with tungsten carbide bits, and have finally settled on drill rod, high speed steel and oil-hardening tool steels as the most suitable tool tips. The hole machined assumes the same shape as the tool bit as the latter drives the carbide abrasive against the work.

Handling The Abrasive

Forshey says they've also learned that the abrasive must be carefully handled. It's kept circulating in its tank adjacent to the machine so that fresh cutting agents are always in suspension, and subsequently brought to bear on the work. There's a tendency for used slurry to cake in the bottom of a partially developed hole. This dictated the adoption of hollow tool tips, through which the abrasive is introduced. This way the cutting agent first enters under pressure at the bottom of a hole, and is quickly driven against the work by the vibrating tool. It's carried up out of the hole around the tool tip more easily than slurry which first enters the hole from the top by free flooding.

Hollow tool tips are most suitable for the larger diameter holes they have to sink, says Forshey. Their range of operations in the non-conductors calls for them to produce holes from 0.020 to ¾" dia, and sometimes through material up to 1" thick. With a hollow tip, they remove a slug from the workpiece much like it's done in trepanning. The ¾" dia holes are done in Pyrex or plate glass. Maximum diameters they've handled so far in quartz is ½", and about ¼" is the maximum through ceramics.

Forshey's operators are still in the learning stage in ultrasonics, but they're making progress. When you realize that they're part of a research effort, you can appreciate that it's valuable to them to find—as they have — the limitations to their machines and methods. For example, they've learned that spark gap machining is more practical than ultrasonics for putting holes in tungsten.

Future developments might cause them to change from ultrasonics in machining non-conductive materials — or they might lead to refinements and the purchase of additional ultrasonic tools. In either event, they will have accumulated a wealth of information that might be converted into more profitable production in industry. And if the hardware they're producing performs as it should in a successful space probe, the recollection of earlier disappointments in the project might not be quite so haunting.

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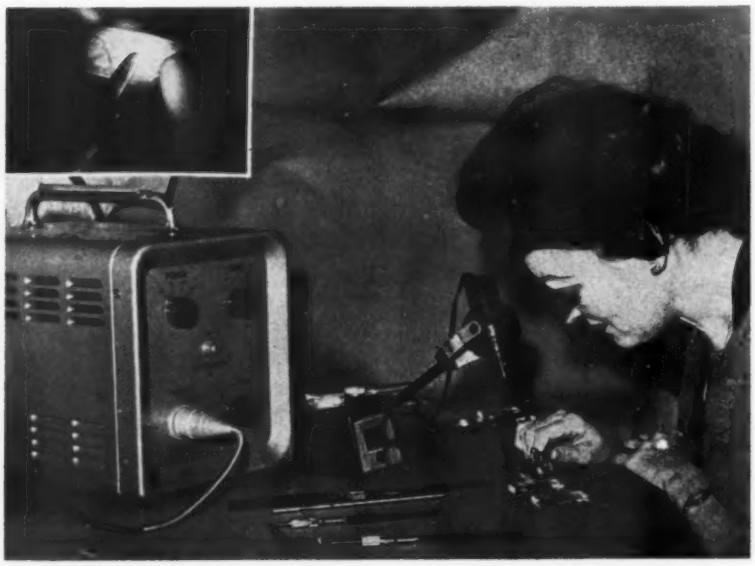
Miniature Welds Without Heat

Heatless welding and fluxless soldering with ultrasonics are said to be possible using the Micro-Joining kit manufactured by Cavitron Corp., Long Island City, N.Y.

The table-sized unit, a boon to electronics parts producers and others in small assembly work, has interchangeable hand pieces that will accomplish smaller welds and solders than ever before possible, says Cavitron. It will weld leads as fine as 0.0001 dia.

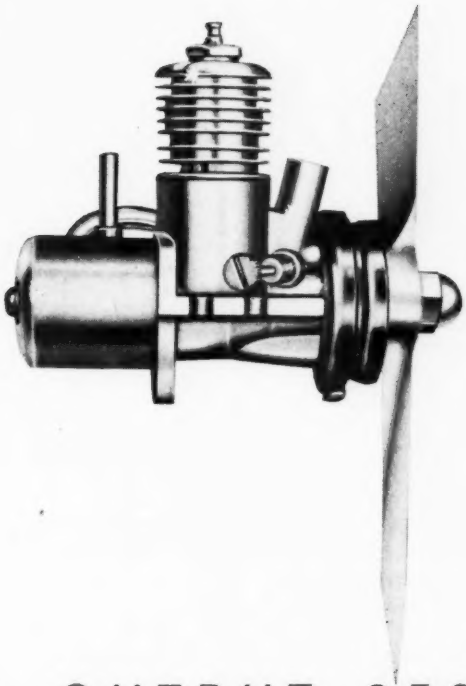
Operator makes a weld with the ball modification of the tweezer weld attachment. Inset is a close-up of a tweezer weld operation.



The kit consists of an ultrasonic transducer handpiece, and four basic inserts. With it, Cavitron researchers have welded gold wire 0.0004 dia, welded CP nickel leads 0.002 dia, and soldered gold wire on gold-plated silicon, and on 0.003 aluminum foil.

The company will also market a table-sized generator to power the unit, though any generator suitable for ultrasonic purposes can be used. The initial set of inserts includes attachments for tweezer welds, a ball-modification of the tweezer insert, and a vibrating table. A wheelhead for seam welding will be optional. Future refinements of the kit call for a standard line of 10 inserts, and a special attachment to weld plastics.

Micro-soldering without flux is possible with the use of a special heating transformer, soldering iron and attachments for hot plate soldering. Inform-A-Gram No. D5.



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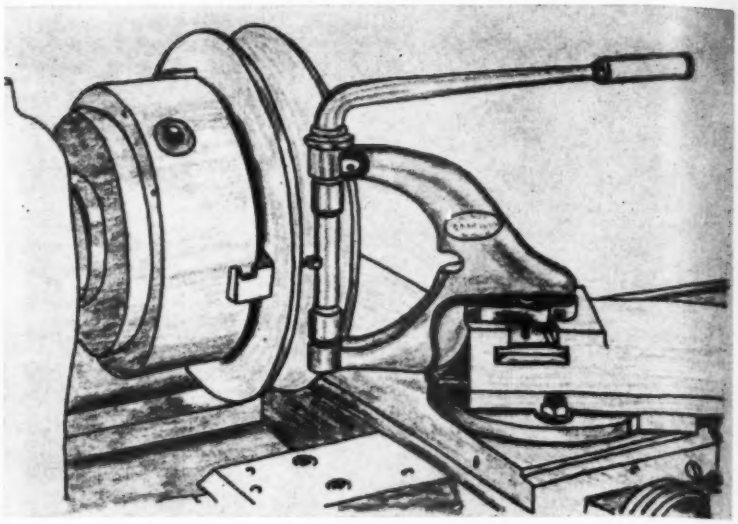


Fig. 1 Groove radius on a bending die can be easily formed with the Radii-Cutter.

Versatile Cutter for Spherical Shapes

Cutting a convex or concave shape often requires expensive profiling machinery and large lathes. Tool men in many plants have simplified the job, and eliminated the need for special machines, by using a versatile attachment for cutting and forming spherical shapes. Users of the Radii-Cutter claim that an unskilled operator can hold micro-tolerances on such parts as balls, sockets, ball bearing races, profile templates, form rollers, and bending dies.

The unique feature of the Radii-Cutter is its radii setting, done entirely by a depth micrometer. The unit attaches easily to the compound of any lathe. It can also be used on turret lathes and some types of milling machines. Costly form tool bits, multiple tool setups, and repetitious measurements are not needed, according to Holdridge Mfg. Co., Los Angeles maker of the tool.

It consists of a "C" yoke, parallel micrometer bar, tie down plate, and carbide tool bits. Straight spindle yokes, extra tool bits, and a calibrated dial are used to form pipe bending dies and similar parts.

The Radii-Cutter has been successfully used to cut convex internal radii, often necessary in aircraft work. Cuts of this type can be made on parts with holes of even less than ½" dia.

In another application, the unit is used to form a 2" groove radius on the outer portion of a bending die. The cut is made much deeper than the depth of the radius because the entire tool can enter the groove. The tool bit is turned 90° by using the calibrated dial. Enough friction is applied by the lockscrew in the frame to allow one wall to be cleared while feeding downward. The radius at the bottom of the groove is cut by swinging the bit through 180° and reversing the feed to clean the opposite wall in one continuous cut.

A wide range of work can be handled by the 3" models, designed for 9" to 12" lathes. They make cuts from 0 to 3" convex, 0 to 3" concave radius depth in sockets, and up to 8" in sockets on parts larger than 3". The radius depth is lessened by about ½" on the 8" cut to allow for the boss line of the frame. Cutter sets are also available for larger lathes. end

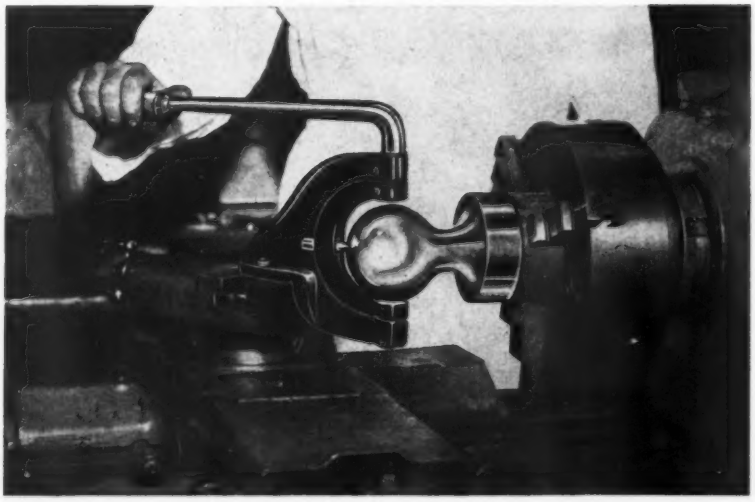
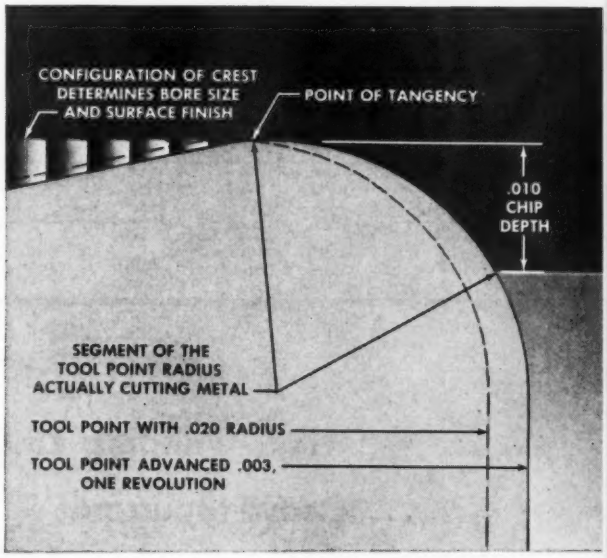


Fig. 2 Carbide-tipped tool bit in "C" yoke shapes a 4" ball end from heat treated 4140 steel. A straight spindle yoke was used to turn the neck of the part.

special report from Fair Street ... ONE OF A SERIES ... on cutting tool geometry


CONFIGURATION OF CREST DETERMINES BORE SIZE AND SURFACE FINISH
POINT OF TANGENCY
.010 CHIP DEPTH
SEGMENT OF THE TOOL POINT RADIUS ACTUALLY CUTTING METAL
TOOL POINT WITH .020 RADIUS
TOOL POINT ADVANCED .003, ONE REVOLUTION

why accurate blend of nose radius to cutting edge angles is all-important

Function of the nose radius in a single point cutting tool is to gradually decrease chip thickness at or near the finishing point of the tool. This controlled decrease in chip thickness greatly reduces pressure and heat generation on the cutting edge of the tool in the area of the finishing point.

As illustrated above right, the finishing point of a single point cutting tool is actually the high point of the nose radius just prior to its blending into the end cutting edge angle. This point is the heart of the machining process. Improper grinding technique will not result in a radius, but produces a form ground with flats or one that does not blend perfectly to the cutting edge angles. In either case the tool cannot perform its proper function. Hence, the thousands of dollars in engineering, tooling and machines are not being used most effectively.

As all-important as the nose radius blend is, it is virtually impossible to control this nose radius by conventional grinding practices. Using a regular offhand grinder, the operator is forced to dub in a free hand radius after carefully generating end cutting and side cutting edges. He has no other choice.

NEW MICROPOINT TOOL GRINDER SOLVES THE PROBLEM

The problem of accurate blend of nose radius to cutting edge angles for maximum efficiency has been completely solved by the DeVlieg MICROPOINT Tool Grinder, a new type of single point tool grinder developed by the DeVlieg Machine Company.

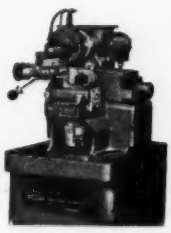
This new machine, the first grinder in its field able to grind tool profiles geometrically correct to gauge room accuracy, generates the side cutting edge and end cutting edge exactly tangent to a geometrically perfect nose radius. This accuracy is an automatic function of the machine and is in no way dependent upon the human element of the machine operator.

ABSOLUTE CONTROL OF TOOL GEOMETRY

Not just another grinder, MICROPOINT is a precision machine that makes possible a new technique of single point tool grinding. Advantages of this new technique include greater cutting tool life, increased accuracy in output of machine tools and greatly improved uniformity and finish of the end product.

Direct dial settings provide a method of fast, simple, accurate adjustment for radius, cutting edge angles, tool point offset and relief in exact accordance with the geometric requirements of the tool in a full range of sizes and shapes.

For further information about the DeVlieg MICROPOINT Tool Grinder, please write or visit DeVlieg Machine Company, Fair Street, Royal Oak, Michigan.



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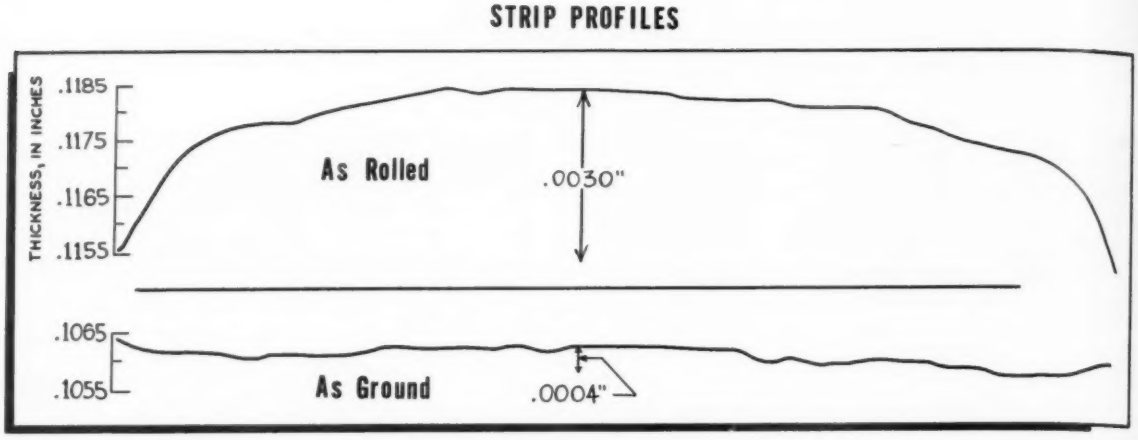
for grinding all sizes and types of round and square shanked tools

CIRCLE INFORM-A-GRAM KEY NO. 63



New Grinding Line
. . . to save thousands / year

Eight years of development work between The Hill Acme Co., Cleveland, Ohio, Behr-Manning Co., and Wallingford Steel Co. has culminated in the creation of a $300,000 grinding line. This line saves nearly ⅔ of previous grinding costs, and produces "machined quality" stainless steel, a "first" in steel industry history. It adds a revolutionary benefit to fabricators and other users by holding thickness variations across the width of stainless strip to less than 0.005.

Wallingford Steel, Wallingford, Conn., claims to be the first stainless steel producer able to supply strip that will meet the exacting tolerances being specified for aircraft, missiles and space vehicles.

The two grinders, with their coated abrasive belts running in oil, replace two former grinding lines of five machines each, and improve quality substantially.

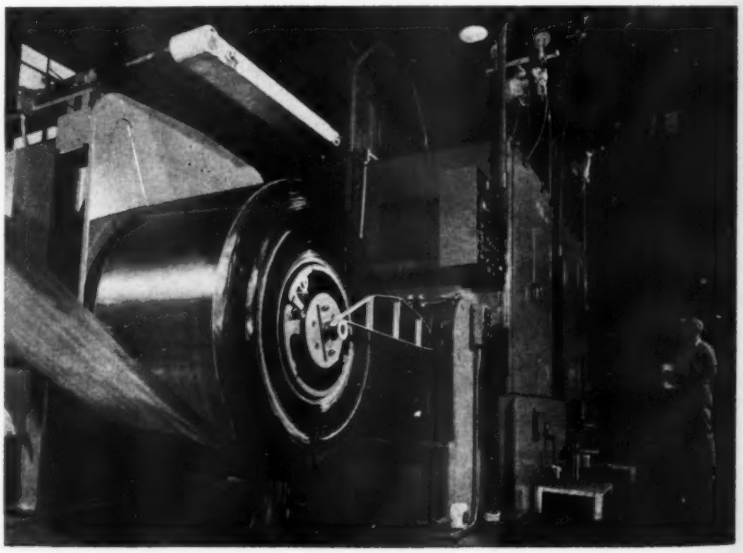
Another economy is the line's ability to salvage entire coils which formerly had to be shipped back to the mill for remelting. Frequently, imperfections were too deep for the old dry grinding lines to handle.

Early estimates have pointed to probable savings in direct labor cost. Savings in abrasive belts alone were estimated to be nearly $91,000/yr. It has already become clear that savings will exceed that rate. About 25% of the plant's production will be ground on the new line. A 10 coil order can now be filled in 12 hrs, instead of the 65 formerly required.

The line consists of two 60 hp vertical grinders running in tandem, each driving 30 x 126″ cloth belts, all resin bonded, with aluminum oxide or silicon carbide abrasives. These belts grind in a flood of sulfur-chlorinated oil pumped to each grinding head at 65 gal/min (maximum capacity 100 gal) from a 4,000 gal reservoir and filtration system. When high polishes are required, glue-bonded belts of cloth or paper will be used.

The coil is under endwise tension of 30,000 lb, and bent sharply at angles up to 20°. It is forced between "break" rolls as it approaches and leaves the grinding point. Also, an 8″ dia solid steel work support roll forces the strip against the belt by hydraulic pressure. With these heavy compo-

Fig. 1 The new wide belt grinding line viewed from output end.



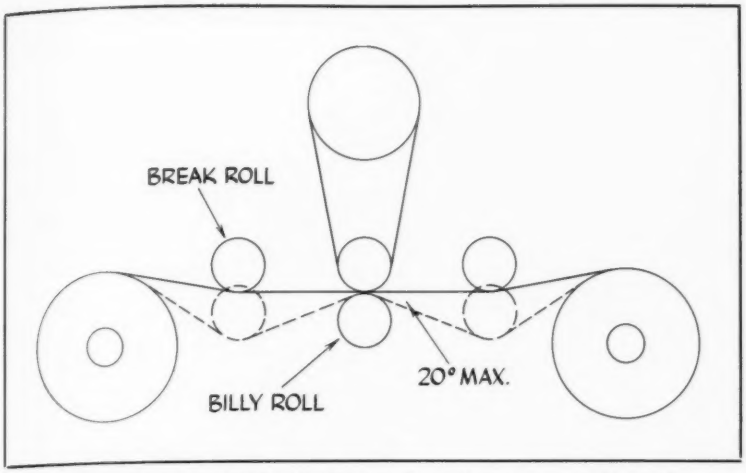


Fig. 2 How the break rolls flatten the strip as it approaches and leaves the grinding point.

nents, the machine can handle strip up to 0.240″ thick.

Contact rolls ranging from 45 to 90 Durometer operate at 900 to 1800 rpm, giving belt speeds of 2100 to 4200 sfpm.

A comparison of oil vs. dry grinding on tube mill stock shows one pass as against three, one belt consumed instead of four belts, and 63 min required instead of 134. These processing times include coil handling.

Instrumentation and accessory equipment are complete and unique. An X-ray gage automatically traverses across the strip and records thickness on a moving reel of paper. In addition to the Delpark filtration system, precipitrons extract oil vapor from the exhaust system. A spot welder attaches the lead strip to the trailing end of each coil. Further circuits are safe throughout. Belt breakage or lowered oil level shuts off all power and applies brakes to rotating parts, while fire extinguishers are pointed at grinding heads and filter tanks.

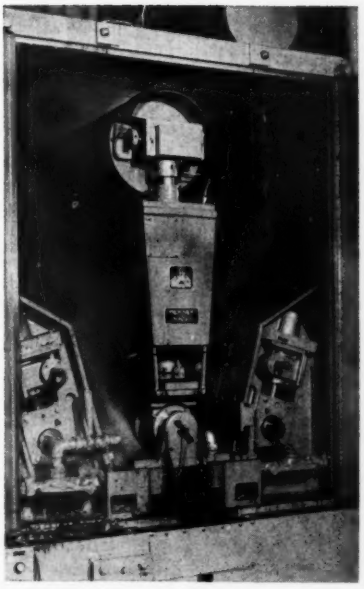
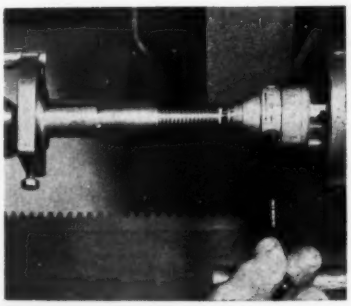


Fig. 3 Here's a 30″ wide coated abrasive belt removing crown at a surface speed of 4200 fpm, using a knurled steel contact roll.

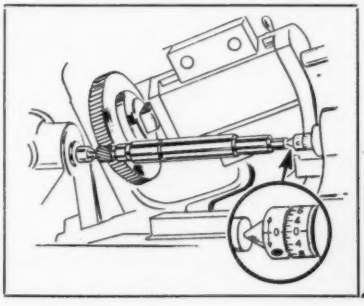
'Micro-Set' Applications Expand

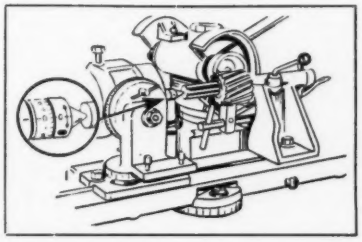


An adjustable tailstock centering device, originally introduced for lathe work, has been extended in usefulness to include aligning work on cylindrical grinders, cutter grinders, gear shavers and tracer attachments.

The "Micro-Set" Adjustable Center is made by Enco Mfg. Co., 4520 W. Fullerton Ave., Chicago. It's said to permit precise headstock-tailstock alignment in half the time required by former centering techniques.

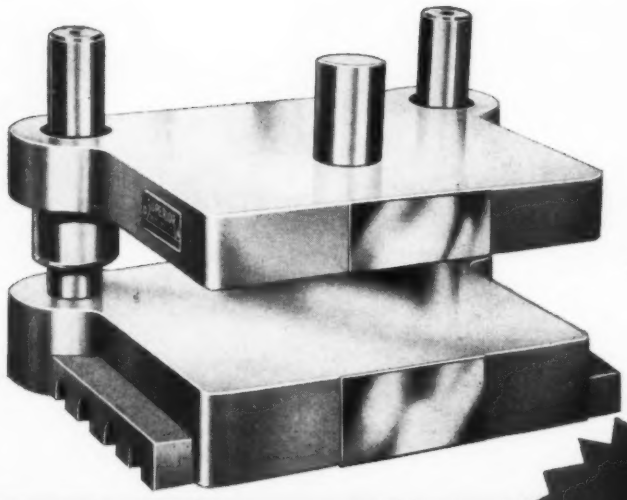
It consists of an eccentrically-ground sleeve and arbor, which, when assembled, complement each other at zero, and embody a true center. When the zero on the arbor is moved either side of zero on the sleeve, the center point moves in a 0.006″ radial arc, providing micro adjustment. Each





calibration moves the tip 0.0005″ or 0.001″ on diameter, which is read directly on the sleeve by the operator. Total tip movement in either direction is 0.006″.

The Micro-Set center is available in #2, #3, and #4 Morse Taper, #6 through #11 Brown & Sharpe Taper, #6 through #12 Jarno Taper, and ¾″ to 1½″ straight shank. Write the company for more data on the device, or Circle Inform-A-Gram No. D6.



SUPERIOR DIE SET Exclusives

SAVE TIME AND CUT OVERALL DIE MAKING COSTS!!

No fumbling or wasted time with large or small die sets when you use Superior. Assembly and disassembly of these precision sets is rapid. In addition they provide safety insurance . . . protection for the skilled hands of die makers and handlers . . . protection also against the ruining of costly dies in handling, or even damaging valuable press equipment.

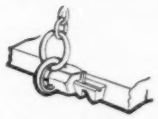
All Superior Die sets are jig bored to your specifications—result number of die set sizes practically limitless.

Add to this such outstanding features as *Precision Center Marks, Long and Short Bushings, Superfinish Pins* and you can see why Superior is your best die set buy.

Write today for 24 page catalog.

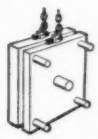
SAFETY FLANGE

protects fingers by providing roomy gripping space on either side of the die shoe.



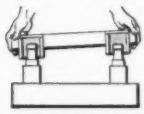
LOCK-JAW LIFTING DEVICE

removes the danger of handling large die sets.



E-Z LIFT SLING CHAIN

attach to the lock-jaw for immediate lifting.



"REMOVABLE CAP" PINS

End troublesome binding in parting dies.

SUPERIOR
DIE SET CORP.

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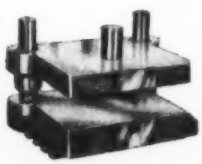
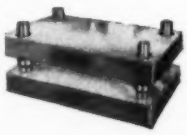
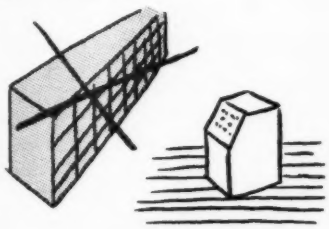
and CHESHIRE, CONN.





CIRCLE INFORM-A-GRAM KEY NO. 66

Save Hundreds of Hours



Another milestone in development of the first operational electronic literature searching service has been announced by Allan Ray Putnam, managing director of American Society for Metals.

ASM's Information Searching Service, he said, is now using a commercial general-purpose computer. All searching operations are done on a General Electric high-speed electronic computer. This equipment, though not specifically designed for information searching, has been readily programmed to handle the electronic requirements of the ASM-WRU data processing system.

General Electric is designing a tailored information search system incorporating the new GE-225 computer. First of these units will be delivered to the Documentation Center at Western Reserve this year, and will incorporate a stored program.

All searches are designed to meet exact needs of the subscriber. They provide him with complete, thorough and up-to-date coverage of all publications in his field of interest. The individual or company laboratory can be saved hundreds of hours of library work and reading time. Further information can be obtained from ASM Documentation Service, Metals Park, Novelty, Ohio.

New Features on Finishers

Now available on all models of Hammond Flat Finishers is a new automatic air actuated belt tracking and oscillation feature. This unique device assures longer belt life, better finish, and a substantial savings in labor after tracking has been set, it requires no further attention until a new belt is installed.

Other features which distinguish these Finishers are: Automatic air tensioning, a variable speed conveyor and "work pressure" ammeters on each head.

As you may know these finishers are available with single or multiple heads for abrasive belt widths of 6", 8", and 12". They are high production machines for the wet abrasive belt grinding, polishing, and deburring of flat work.

New Home

Giddings & Lewis Machine Tool Co. recently moved the manufacture of its Bickford line of drilling products from Cincinnati to enlarged facilities in Kaukauna, Wis. Company officials say the Kaukauna plant provides the largest production capacity for radial drilling machines and heavy-duty upright drilling machines in the industry.

The move to Kaukauna centralized all the company's domestic machine tool manufacturing operations in Wisconsin. Foreign manufacturing operations are carried out in Germany and Scotland.

CHROMELLOY

Chromelloy quickly hardens any steel, even cold rolled, by a carburizing, nitriding and alloying effect. Mild steel tools or parts, Chromelloy treated, will outlast by several times same items made of tool steel and hardened in usual way. Easy and safe to use—no cyanide. Used over ten years by largest plants.

U. S. Metallurgical Laboratories
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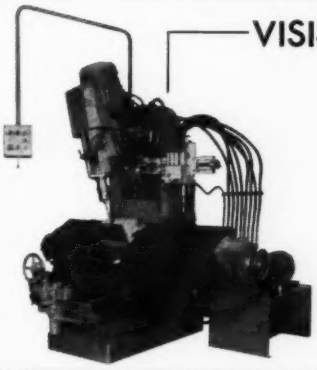
VISI-TROL
BED TYPE
SWIVEL MILL
WITH
SELF CONTAINED HEAD



HEAD AND TABLE
TILT 45° EACH SIDE
FROM CENTER

VISI-TROL ENGINEERING CO.
12720 BURT RD. DETROIT 23, MICHIGAN
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Fasteners Handbook	$12.50 ea.
Gears For Small Mechanisms	$ 5.00 ea.
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Fortune
TUMBLING MEDIA
for **Deburring and Finishing**

Preforms in over 300 shapes, sizes and bonds for all barrel and vibratory operations.
- **Finest bonding materials**
- **No "roll-over" of burrs**
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Free lab service reports proper media for your parts.
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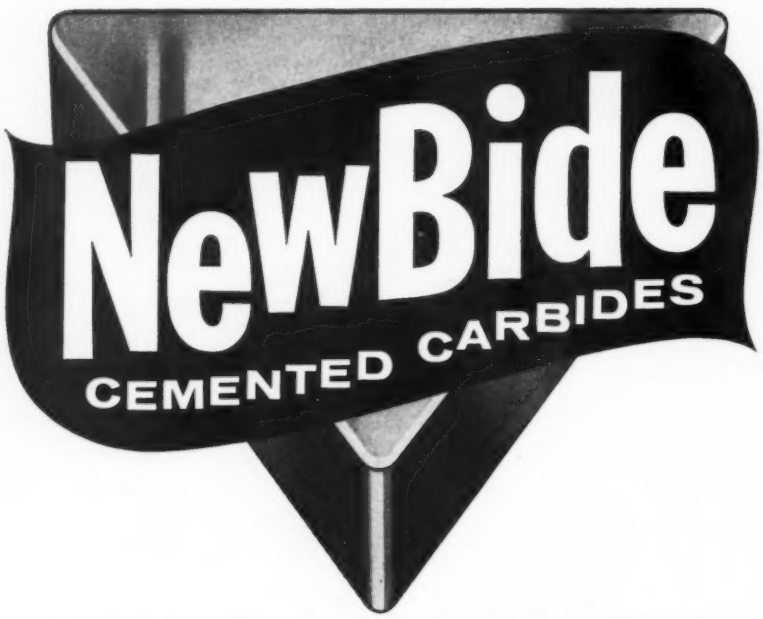
Another Newcomer first!

A "MIXED CRYSTAL" PROCESS OF CARBIDE MANUFACTURE



Newcomer crashes the metallurgical barrier in carbide development with NewBide—a new type of cemented carbide produced by the precipitation of mixed crystals from a solid solution.

NewBide possesses unusual high crater and wear resistance, thereby effecting greater savings through wider range of application per grade, fewer grade inventories and extra performance. Only one cast iron grade (N-20) and four steel cutting grades (N-50, N-60, N-70, N-80) cover practically all metal cutting applications!

special introductory offer

GRADE N-20 NewBide . . . all standard blanks and inserts priced at one or more—regardless of quantity! Grade N-20, an outstanding example of the mixed crystal process, is production-proved for cutting non-ferrous metals, high temperature alloys and all types of cast iron. Order today or send for complete NewBide Price List N60B.

NP CONTROLLED QUALITY CARBIDE

NEWCOMER PRODUCTS, INC.
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General Sales Office: 512 Franklin Ave., Pittsburgh 21, Pa.
CHurchill 1-4060

When you need carbide . . . buy NewBide for better "CUTABILITY"

CIRCLE INFORM-A-GRAM KEY NO. 68

Tubes 'Cold Rolled' Into Tube Sheet

Rolling condenser tubes into the tube sheet, instead of welding them, has eliminated heat exchanger corrosion problems.

Two horizontal condensers, with Hastelloy B heat exchanger tubes rolled into the tube sheet, have processed highly corrosive mixtures continuously for three years without developing leaks. Although the hard, tough Hastelloy B furnished by Carpenter Steel's Alloy Tube Div., is difficult to cold work, the extra effort paid off by eliminating the corrosion-susceptible heat-sensitized area around welded joints.

Heat exchangers with welded tube sheets which processed the same type of fluids for the same length of time developed corrosion leaks on an average of twice a year. In addition to the maintenance expense involved in removing the tube bundle and repairing the leaking joints, each shut-down meant losing a half-day's production.

New Lease Program

A new program, enabling manufacturers to lease any of the complete line of automatic high production machinery made by The Baird Machine Co., Stratford, Conn., has been announced.

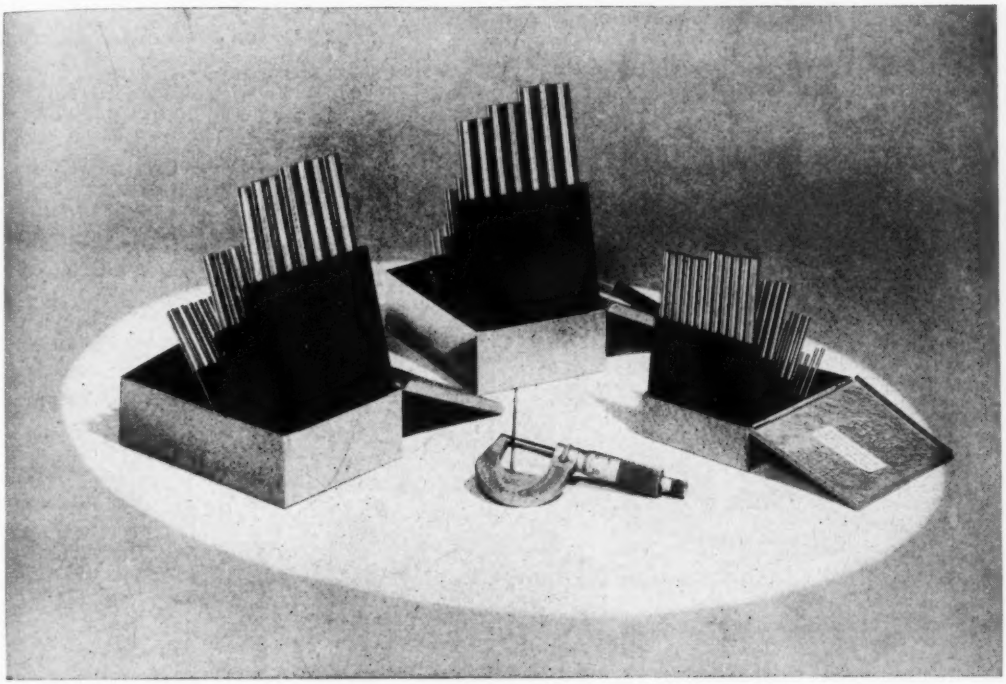
The leasing arrangement, called "The Equilease Plan," was organized to fill the needs of commerce and industry for the long-term financing of productive assets through the medium of leasing, both here and abroad. Contrary to popular conception, the prime objective of leasing today is not for tax purposes but for capital conservation — the freeing of capital so that it can be put to work for inventory, processing, etc., instead of "freezing" it in fixed assets.

The Equilease Plan enables a manufacturer to lease any of Baird Machine's vertical lathes, automatic chuckers, transfer presses, four-slides and other machinery on a monthly rental base term of 60 months. The lessee can renew the lease or purchase the equipment after that period.

WILLIAM T. HUTCHINSON CO.

53 BROWN AVENUE SPRINGFIELD, NEW JERSEY

HUTCHINSON HSS BLANKS



115 Pieces – COMPLETE – .040" to .500" – $88.00

your choice of two tolerances
+ .0002" − .0000
or
+ .0000 − .0002"

JOBBER SET	LETTER SET	WIRE SET
$32.27	$29.03	$27.40
in Huot Index	in Huot Index	in Huot Index

M2 — HIGH SPEED STEEL — 64 "C" scale hard — gage tolerance — mirror finish — parallel ground.

ANY DECIMAL DIAMETER OF STANDARD LENGTH
.012" TO 1.000" SHIPPED ON 24 HOUR NOTICE

CIRCLE INFORM-A-GRAM KEY NO. 69

TV Speeds Accurate Locating

Improved accuracy, increased production, and elimination of the need for a second operator to precisely position the cutting tool are important benefits being derived from the installation of a closed-circuit television system on a Gray horizontal milling and boring machine. This unique setup is being used in the completely air conditioned plant of Buell Die & Machine Co., a member of the Detroit Tooling Assn.

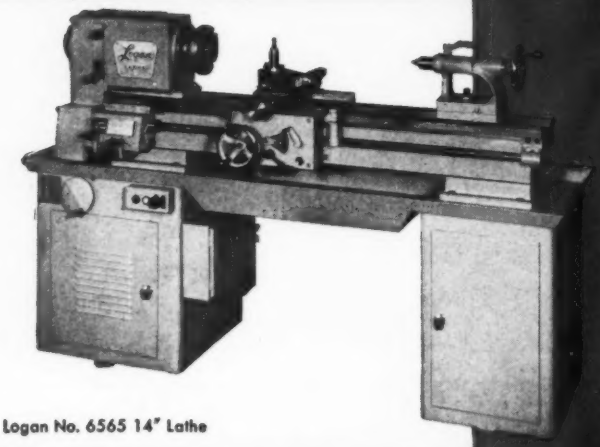
On this huge machine, the tool carriage can be traversed 12′ vertically, 18′ transversely, and 5′ toward or away from the work. Vertical as well as in-and-out movement can be accurately controlled by the operator from his position on the movable carriage. However, for precise horizontal location, the operator had to go back-and-forth between the controls on the carriage and a vernier scale on the bed of the machine, or have a second operator stationed at the scale.

Now, with the TV system, the operator can quickly and accurately control all movements of the cutting tool without leaving his position on the movable carriage, and a second operator is not required. As a result, productivity has been boosted substantially. The TV camera, mounted under a step-plate at the bottom of the movable machine column, is focused at all times on and continuously scans the illuminated vernier scale secured to the machine bed. The 14" screen is mounted on the tool carriage, directly in front of and slightly above the operator's station.

In addition to the increased productivity and greatly improved convenience, the setup has resulted in greater accuracy. While the vernier scale is graduated in 0.050 increments, these increments become ¼" apart on the TV screen. As a result, it is easy for the operator, by virtue of the vernier plate, to interpolate to an accuracy of "tenths."

its specifications add up to high production capacity

Logan 14" Lathe



Logan No. 6565 14" Lathe

Logan designs greater reliability and accuracy, and longer life into its lathes by a generous combination of high-capacity features. For instance—

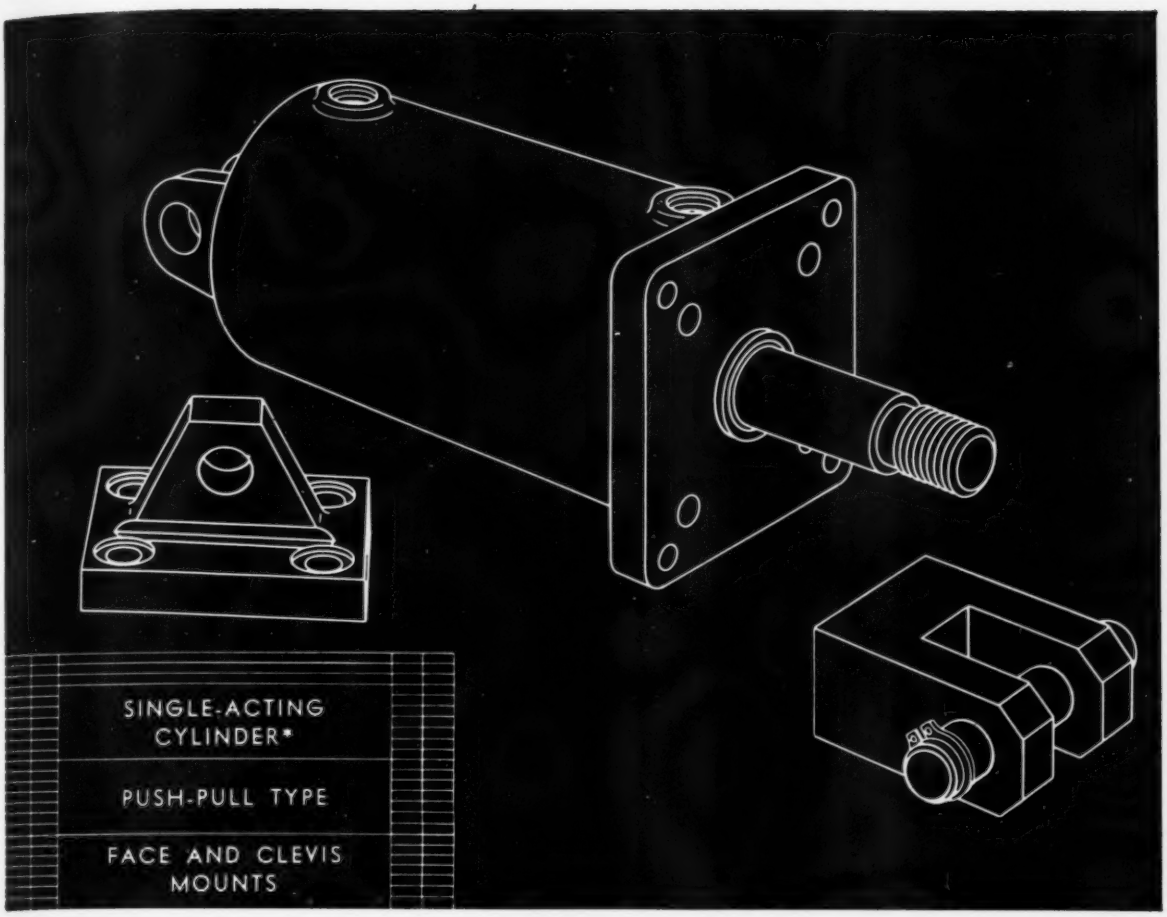
- An oversize spindle with 1⅝" bore turns on four super-precision ball bearings with built-in preload
- A variable-speed drive lets you change speed while work is turning—without shifting belts
- A warp-free lathe bed with high, strong walls braced by oversize ribs to withstand heaviest stresses; two V-ways and two flat ways are flame-hardened and precision-ground.

There are many more reasons why this and other Logan Lathes have a greater capacity. The complete specifications tell the story. Write for them.

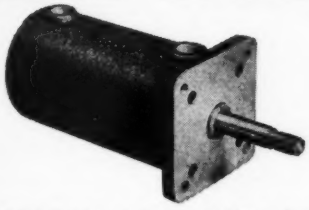
- Spindle speeds to 2000 rpm
- 1½" Levermatic collet chuck capacity
- 14⅜" swing over bed
- 9" swing over saddle cross slide
- 40" between centers

LOGAN ENGINEERING CO. Dept. M-261, 4901 Lawrence Avenue, Chicago 30, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 70



New MEAD single-acting cylinder can *PUSH* or PULL



DESIGN ADVANTAGES

- Pressure tightening seals throughout.
- 3-way instead of more costly 4-way valve may be used.
- Conical return spring assures long life and uniform tension.
- Return spring recessed in cover for compactness.
- Oilite rod cartridge provides durable wearing surface.
- Air consumption considerably less than that on double-acting models.
- Full floating double-up piston cup for extended life.

Wherever a job calls for pushing, squeezing, lifting, holding, tilting or sliding, there's a place for MEAD Air Clamps.

*May be used as a double-acting cylinder if desired.

With the latest addition to its famous "Air Clamp" line, MEAD presents two new mounting styles that combine spring-return simplicity with push-pull versatility. Using *only slightly more than half the air volume* required by double-acting cylinders of the same size, MEAD Air Clamps also reduce the complexity of valving and piping. Two new mounting styles — face and clevis — offer complete application flexibility. The new MEAD push-pull cylinders are available in 2¼", 3", 4" and 5" bore sizes with 1", 2" or 3" strokes.

For further details and information on fast delivery and economical prices, write MEAD *today*.

PRODUCTS FOR AUTOMATION

MEAD
FLUID DYNAMICS

A DIVISION OF MEAD SPECIALTIES CO.
4114 N. Knox Ave., Dept. 921, Chicago 41, ILL.

ASK YOUR MEAD MAN for more dollar-saving automation ideas

CIRCLE INFORM-A-GRAM KEY NO. 71

Catalogs and other helpful literature

Shoulder Bushing attachments for trouble-free operation of any die set are the subject of a data sheet from Producto Machine Co. Called "Pin-Pals," the attachments are installed free on all Producto die sets with 1, 1¼, and 1½" dia pins. Inform-A-Gram No. C1.

Die Springs in chrome-vanadium and square and oval wire carbon steel, are described in a new catalog from The Producto Machine Co. Cap and socket screws, stripper bolts, dowel pins, and other accessories are also listed. Inform-A-Gram No. C2.

Buck chuck on Gisholt CRI-DAN helps make amazing savings

Photos — Acme Industrial Co., Chicago

Smart production 467% faster!

The problem: a 20 NF Class 3 thread up to shoulder in bore on hex end of 440C stainless spool valve. Tapping was slow, breakage excessive . . . hardening shrunk and distorted threads . . . rejects as high as 20%.

The solution: A CRI-DAN lathe with a Buck compensating chuck, with internal pilot bushing, to center and grip work instantly for automatic taper threading with .4675" go —.4701" no-go precision. Result: 5.03 *minutes saved per part . . . no rejects.*

In your shop, too, you'll make money *every* time you chuck with Buck.

FREE catalog write —

BUCK TOOL COMPANY

218 Schippers Lane • Kalamazoo, Mich.

Makers of Scroll, Power, Dust Proof, Independent Chucks.

CIRCLE INFORM-A-GRAM KEY NO. 72

Special tools, and those for drilling, fastening and abrasives, abound in Buckeye Tools Corp.'s new 72-page Catalog 61. Electric tools and accessories are also included. For your free copy circle C3.

Infinitely Variable pre-selective feeds and 24 speeds, ranging from 70 to 2400 rpm are features of the new Burgmaster Model 3BHT-B turret drilling, tapping and boring machine. Burg Tool Mfg. Co. also mentions a 4-speed, 15 HP, motor and 3-axis automatic depth control by tape. Check Inform-A-Gram No. C4 for bulletin.

Applications of the flexible Delta radial drill press are illustrated and recorded in a bulletin from Rockwell Mfg. Co., Delta Power Tool Div., circle C5.

Steel Die Sets are illustrated and technically explained in a brochure issued by Wheatley Economy Die Sets, Inc. Interested? Then circle Inform-A-Gram No. C6 for your copy.

Copper-base Extruded Rectangles for severe wear and abrasion applications are outlined in Bulletin G-50B by Ampco Metal, Inc. For free copy circle Inform-A-Gram No. C7.

Every type of shear blade and knife used in the metal working industry can be found in Wapakoneta Machine Company's 84-page "Wapag Metal Cutting Knives Manual." It's yours for circling Inform-A-Gram No. C8.

A Compact Lathe, "Carbo-Lathe" requiring only 13 sq ft of floor space, is the subject of a bulletin by Burkhard Bros., Inc. Inform-A-Gram No. C9.

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*Complete With Magnetic Nozzle Holder As Shown (In U.S.A.)

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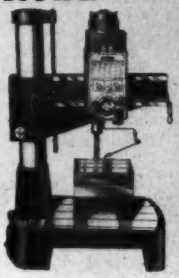

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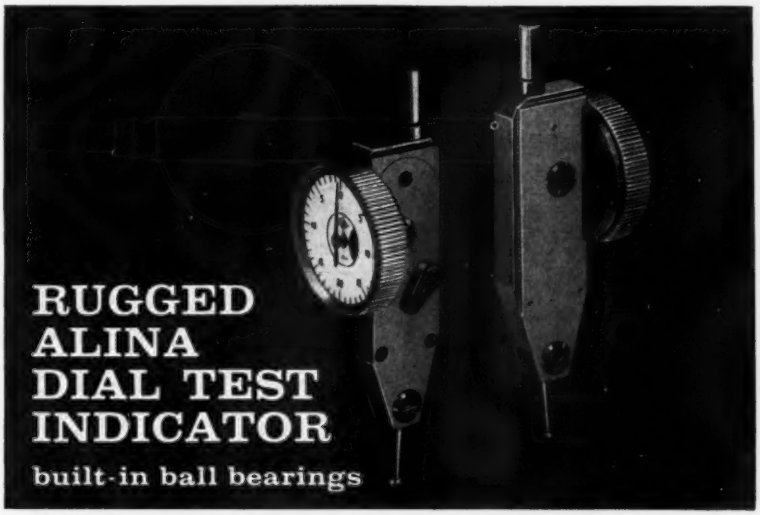

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- Reading 0-20-0 • Fully reversible contact point
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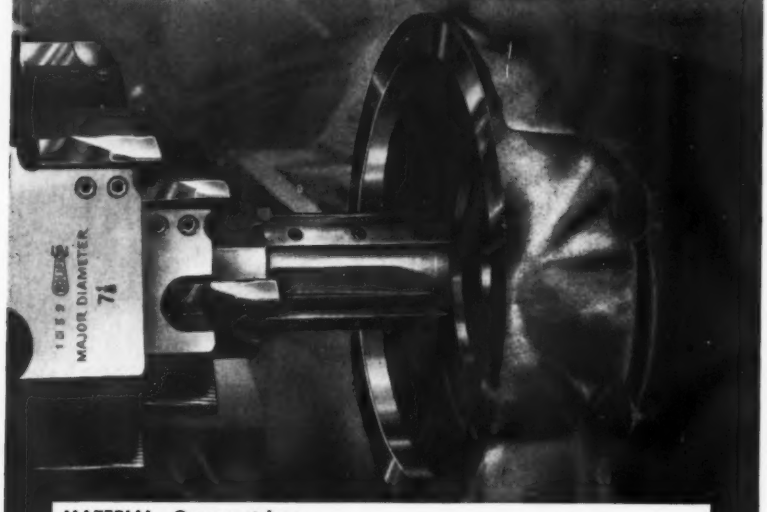
DESIGNED FOR YOUR TOUGHEST PRECISION CUTTING JOBS



MATERIAL:	Grey cast iron.
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TOOL:	Eclipse multi-operation carbide tipped inserted blade cutter equipped with a replaceable bronze wear stripped pilot.
RESULT:	Finer finish, accurate size and absolute concentricity.

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CIRCLE INFORM-A-GRAM KEY NO. 742

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Since 1907
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CIRCLE INFORM-A-GRAM KEY NO. 743

Catalogs . . .

Maximum 200 psi series "S" Midget Air cylinders manufactured by Hannifin Co. are specified in Bulletin 0230-B1. Both universal mounting and nose mounting models in ¾, 1 and 1⅛" bore sizes with standard strokes are fully described. Circle Inform-A-Gram No. C10 for your free copy.

Dimensions for popular turret lathes, plus information on the company's gun drillers and drill speeders, are carried in a new data sheet published by Ward-Riddle Co. Circle No. C11.

A Fortifying Agent for cutting, grinding, tapping and drawing oils is described in new literature issued by Baker/Gubbins Co. Get it by circling No. C12.

Rockwell Hardness Testing equipment is described and illustrated in Catalog RT-60 published by Wilson Mechanical Instrument Div., American Chain & Cable Co. Circle Inform-A-Gram No. C13.

"Bazooka Vacuum Probe and Transducer Bulletin," by Air-Vac Eng. Co. tells how production operators can pick up and handle miniature parts rapidly. Circle Inform-A-Gram No. C14 for your free copy.

Precision Slides designed to measure minute surfaces without skids are described and illustrated in a bulletin from Cleveland Instrument Co., circle Inform-A-Gram No. C15.

Horizontal Boring machines are described and illustrated in a new catalog issued by The Bullard Co. Yours for checking Inform-A-Gram No. C16.

Development, Function, and step-by-step manufacture of modern die sets is told in a 15-minute technical filmstrip with sound. "Die Set Digest," published by Producto Machine Co., explains the film. For your copy of the booklet circle No. C17.

Safety Training Course

"Men & Motives in Safety Supervision," is the title of a low-cost training course for industrial foremen. Training expert Glenn Griffin of the University of Michigan's Bureau of Industrial Relations wrote six text booklets that comprise the course.

The National Safety Council, 425 N. Michigan Avenue, Chicago 11, Ill. will supply additional information.

re·li´a·ble:
That which can always be counted upon to do what is expected or required

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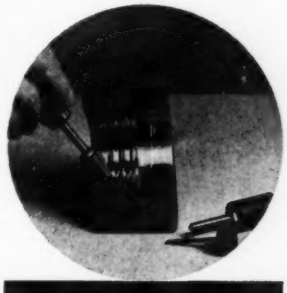

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CIRCLE INFORM-A-GRAM KEY NO. 75

Catalogs . . .

Case Histories of a variety of small, complex powder metallurgy parts are described in "Powder Metallurgy Quarterly." Available through Inform-A-Gram No. C18.

Special Shape mounted point emery wheels are detailed in a new brochure from American Emery Wheel Works. Receive this free Bulletin SS-101 by circling Inform-A-Gram No. C19.

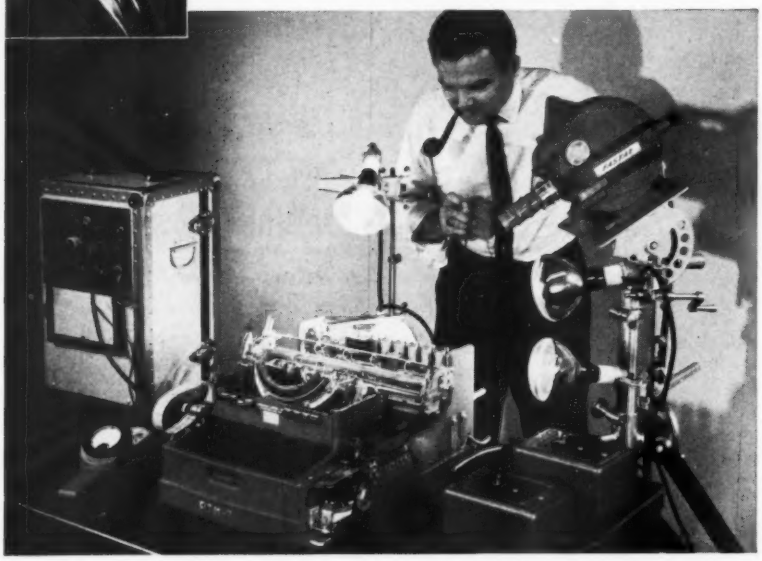
"Studies in Applied Weldesign," is the name of Bulletin 1204.2 available from Lincoln Electric Co., circle Inform-A-Gram No. C20.

Multi-Point Drill Grinder Model DG-1 by Hammond Machinery Builders, Inc. is extolled in Bulletin 711. Circle C21.

Chart of suggested speeds, feeds and styles, for high speed end mills is offered free by Chicago-Latrobe Co. No. C22.

"FASTAX has saved us many, many times its cost,"

says John A. Gehrs, Jr., Manager Product Testing, Commercial Controls Corporation, Subsidiary of Friden, Inc., Rochester, New York.



FASTAX faithfully recording the action of fast-moving parts in the Friden Flexowriter.

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FASTAX can help solve some of your toughest design and development problems. *Inquiries welcomed.*

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OPTICAL COMPANY • ROCHESTER 21, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 76

"Niagara Load Monitor" and "Niagara Tonmeter" — two electronic instruments designed to safeguard presses during production runs — are described and illustrated in Product Report Number Two by Niagara Machine Tool Works. For free copy circle Inform-A-Gram No. C23.

Features of Die stamped circuits are compared with those made by etching copper-clad laminated plastics in bulletin DL by Dytronics, Inc. For your copy of "Designing With Die Stamped Circuits," check Inform-A-Gram No. C24.

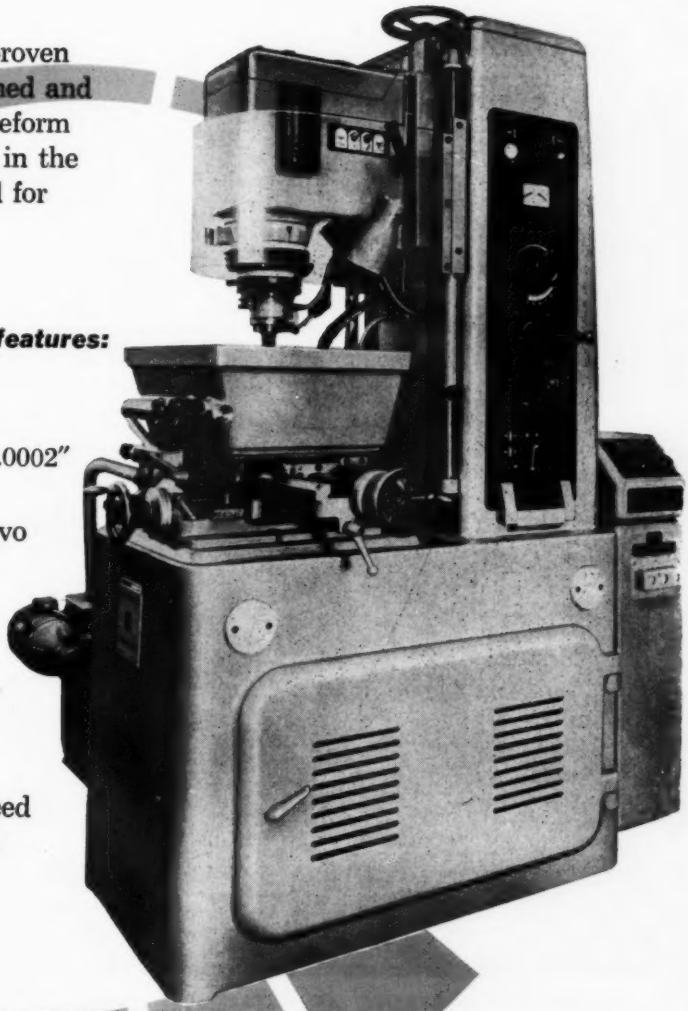
Cleereman Spindlemaster, a multi-tool machine that selects up to thirty tools in seconds, is the subject of Catalog 860 by Jackson-Fotch Co. Circle Inform-A-Gram No. C25 for free copy.

Tube Fittings, accessories, and typical applications are detailed in a catalog from the Lenz Co. Circle Inform-A-Gram No. C26.

ELERODA D1

A precision electrical discharge machine

The ELERODA D1 was the first proven electrical discharge machine designed and engineered by CHARMILLES' Eleform Department, pioneers and leaders in the electrical discharge machining field for many years.



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- The most stable electrical power unit on the market (no tubes)
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- Heavily ribbed castings used throughout
- Simple controls and fully automatic
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CIRCLE INFORM-A-GRAM KEY NO. 77

T·H·G·S·C
SEIBERT
COORDINATED PLANNING

This symbol of efficiency can mean much to you

T H *Advanced design, precise workmanship, fine materials . . . these are some of the advantages of Seibert Production Holding Tools, so important as an element of Coordinated Planning.*

Floating Holders

Spindle Extensions

G *Seibert Gages and Gage Plates make old presetting equipment obsolete. Size of gage plates drastically reduced by circular design.*

Double-Action Top Drivers

Adjustable Adapters

S *Tool Storage Boards provide space for presetting and storing two sets of tooling at the machine, ready for instant installation.*

Recessing Tool Holders

C *Seibert Tool Control Units with meters to record the number of machine cycles between tool grinds. They automatically program tool changes.*

Drill and Top Drivers

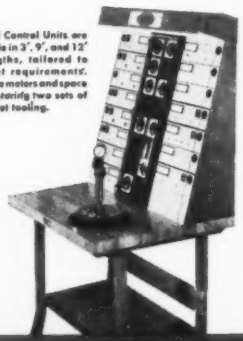
THGSC is not a name, but a combination of initials to represent an idea . . . an *important* idea for production plants which require preset tools for high efficiency, and which are seeking solutions for the following problems: (1) Accuracy and efficiency in presetting, holding, and changing tools. (2) Systematic storage of tools and gages. (3) Dependable and efficient control of tool use to prevent work spoilage, excessive down-time, tool breakage, and machine overload.

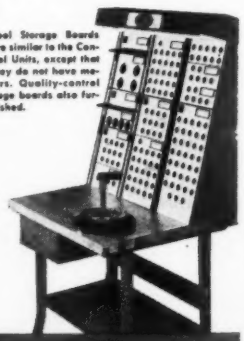
THGSC is the symbol for *Seibert Coordinated Planning*, which is the engineering of a completely coordinated combination of Seibert Tool Holders, Gages and Gage Plates, Storage Units, and Control Units. Such a combination is necessary for operating production metal-working equipment at its highest efficiency and is the key to close teamwork in all operations involved in presetting and changing tools and in the control of tool use.

It is easy to learn of the advantages of *Seibert THGSC Coordinated Planning*, and the best time to do so is when your production-equipment program is in the planning stage or when you are looking ahead to modernization. But we welcome the opportunity at any time to explain how this coordinated planning can reduce tooling costs, and how systematic storage of tools and gages will promote efficiency among operators and inspectors.

Motor Units for all types of equipment. One to eight motors to program tool changes. Mount on wall or machine.

Circular-Type Gage Plates are compact and convenient. One to six holes. Gages have interchangeable heads.


Tool Control Units are made in 3', 9', and 12' lengths, tailored to meet requirements. Have meters and space for storing two sets of preset tooling.


Tool Storage Boards are similar to the Control Units, except that they do not have meters. Quality-control gage boards also furnished.

SEIBERT SEIBERT & SONS, INC.

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COMPRESSION SPRING ASSORTMENT

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Torque Wrench Adapter
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Instantly calculates scale conversion factors for adapters of different lever lengths—set it and read it.

Provides automatic selection of proper torque wrench for adapters and proper adapters to go with given torque wrenches.

Sent free upon request, compliments of

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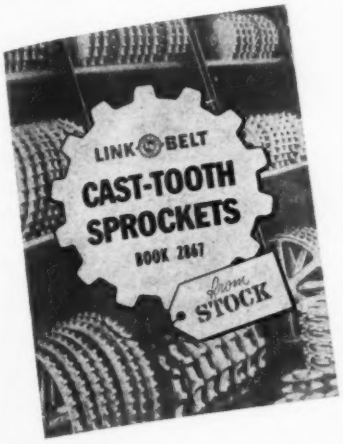
CIRCLE INFORM-A-GRAM KEY NO. 783

Catalogs . . .

Industrial Hose styles are easily selected with alphabetized Bulletin 627 by Aeroquip Corp. For your free copy mark Inform-A-Gram No. C27.

Typical Uses of manganese steel, and the need for hard-surfacing are discussed in an engineering data sheet from Wall Colmonoy Corp. Inform-A-Gram No. C28.



"Link-Belt Cast Tooth Sprockets," are conveniently listed in Book 2867 released by Link-Belt Co., mark No. C29.

Slow-Speed air hydraulic rotating union operating manual is available from Deublin Co. Check Inform-A-Gram No. C30.

"Selecting the right type of diamond tools for specific job," is one of the intriguing chapters in the new comprehensive Catalog A60 by Diamond Tool Research Co. Check No. C31.

Templates illustrating all standard stocked boring bars are included in a free tracing template set for Everede Co. Circle Inform-A-Gram No. C32.

Specialized Tools are illustrated, described and priced in Consumer Catalog 9870 by The Walton Co. Inform-A-Gram No. C33.

Interchangeable Punches, die buttons and retainers are included in precision piercing equipment by Punchcraft, Inc., all mentioned in the company's new literature. Inform-A-Gram No. C34.

Delta 17" drill presses, featuring an all new "up-front" power feed, are described in a bulletin from Rockwell Mfg. Co. Inform-A-Gram No. C35.

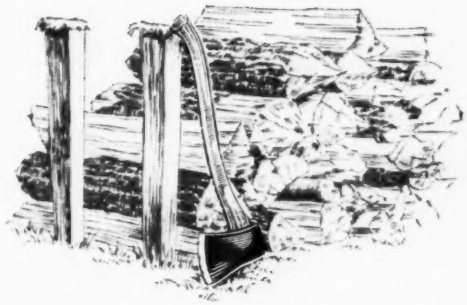
A Machine Mount designed to support loads up to 128,000 lbs/mount, isolating the shock and vibration of mechanical and hydraulic presses 200 ton capacity and greater, is described in a free bulletin by Barry Wright Corp. Circle Inform-A-Gram No. C36.

Four Types of new grinders, manufactured by Landis Tool Co. are described in separate bulletins.

Landis 6" Type R and 10" Type LR semi-automatic plain grinder is illustrated in Bulletin 6RP-60. Check Inform-A-Gram No. C37.

Abrasive Surface grinder is outlined in Catalog 1-1/2-60. Mark Inform-A-Gram No. C38.

Plain Cylindrical grinders type R 10" and type LR 14" are featured in Bulletin 10RP-60. Circle No. C39.



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FREEPORT, PA.

Send today for brochure describing Oberg carbide die services and facilities.

CIRCLE INFORM-A-GRAM KEY NO. 79

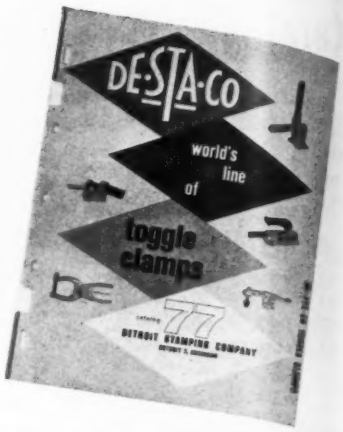
Catalogs . . .

Ultradex Indexing Tables which hold runout, flatness and parallelism to 0.000050 are the subject of Catalog U-100 issued by AA Gage Co. It's free if you circle C40.

Welding and Machining data, as well as design advantages and engineering properties of "T-1" alloy steel castings are discussed in Bulletin 300 by Alloy Steel & Metals Co. Check No. C41.

Open Back Inclinable presses, in 16 through 75 ton capacities, are outlined in a brochure from The Minster Machine Co. Press and slide construction, inclining mechanisms and lubrication arrangements are covered, with photographs. Circle C42.

Chop Saws, electrical and gasoline powered, in a variety of base styles, and chop saw attachments are described in a bulletin from Commercial Tool & Die Company. Inform-A-Gram No. C43.



Toggle Clamps are the topic of 36-page Catalog 77 published by Detroit Stamping Co. It features the firm's full line, and is sprinkled with numerous application photos. Circle Inform-A-Gram No. C44 for a free copy.

Engineering Data on the 4" concentric grinder are available in Bulletin CX-60. Inform-A-Gram No. C45.

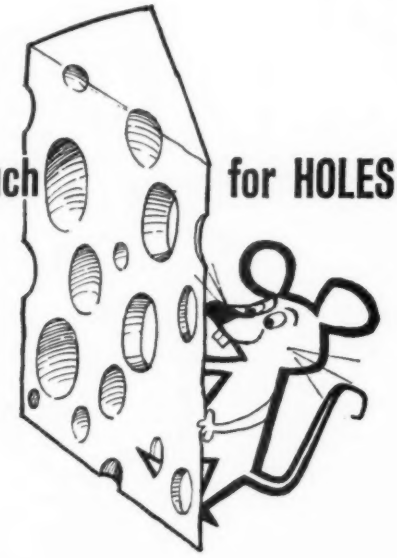
Oils for Hydraulic and circulating systems are described in Sun Oil Company's brochure 66. Eleven straight distilled Circo Oils with viscosities ranging from 55 SUS at 100°F to 140 SUS at 210°F are recommended for systems operating below 120°F. For informative bulletin check Inform-A-Gram No. C46.

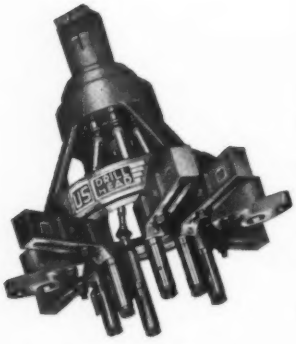
"Projection Welding with Low Carbon Steel," is the title of Bulletin SP-27. Circle Inform-A-Gram No. C47. Bulletin 8-413 extolls "Special Resistance Welders Multi-Spot and Projection," and it's yours for circling Inform-A-Gram No. C48. Both are from the Taylor-Winfield Corp.

Autobend BC-100 press brake control features push button control box, ram positioning switch, actuator, speed sensor and electric foot pedal; according to manufacturer General Automation Corp. Receive free brochure by circling Inform-A-Gram No. C49.

Design Features, operating, capacities and specifications of a new Bickford 9" radial drill are outlined in Catalog R-9 by Giddings & Lewis Machine Tool Co. Check Inform-A-Gram No. C50.

Spending too much for HOLES?





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- SLIP SPINDLE PLATE provides fixed head advantages for production runs.
- SMOOTH, QUIET, POSITIVE DRIVE with hardened shaved gears.
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US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

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CIRCLE INFORM-A-GRAM KEY NO. 80

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saves time on all marking jobs

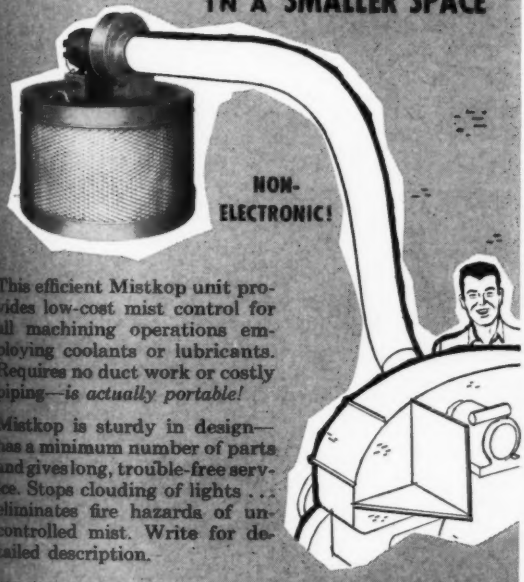
This new Rotor marker has been proven in scores of shops on parts and tools of all sizes...materials of all kinds. Users report it outperforms other air markers and other marking methods in ease and speed. Its fine control, with throttle located *on the tool*, adjusts its speed and depth of mark easily to suit every job. Short-stroke carbide stylus makes up to 12,000 blows per minute. Will not stall while writing.
Try it in your shop and see how it writes circles around other methods! Write for Bulletin AR-2. *The Rotor Tool Company, 26326 Lakeland Blvd., Cleveland 32, Ohio. Subsidiary of The Cooper-Bessemer Corporation.*

ROTOR TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 811

MISTKOP STOPS MIST

COLLECTS MIST-FOG EFFECTIVELY IN A SMALLER SPACE



This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*

Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights . . . eliminates fire hazards of uncontrolled mist. Write for detailed description.

AGET Manufacturing Company
1394 Church Street • Adrian, Michigan

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strength that creates new tooling concepts

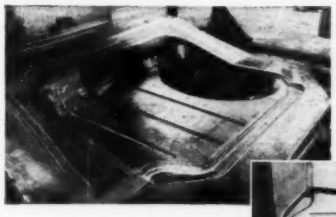
ren ®

PLASTIC TOOLING MATERIALS

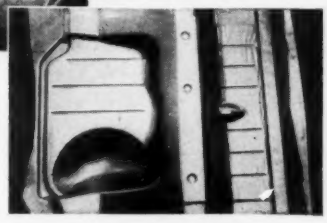
Not all tooling requires the inherent strength of REN epoxy resins. Often these rugged plastics save in construction time, in man-hours and in adaptability, (for easier, faster design changes). Rugged strength is there, too! It allows you to think more creatively than ever before — it encourages design requiring high compressive strength, even to medium production runs. When you think of plastics — think of REN for the finest in epoxy resin compounds.

Send for your free subscription to REN's bi-monthly publication, Tech-Ni-Tips/Tooling Digest.

COMPLEX PLASTIC DIE DRAWS 18,000 PARTS



An epoxy-faced die used in drawing floor pans at Checker Motors Corporation, Kalamazoo, Mich. As many as 18,000 parts have been drawn using a die of this type.



Floor pan drawn by epoxy faced die (above). Checker has drawn up to 10 major body panels using epoxy dies.

OFFICES AND WAREHOUSES IN PRINCIPAL CITIES.

ren **plastics, inc.**
WRITE DEPT. 60-5
lansing 9, michigan

CIRCLE INFORM-A-GRAM KEY NO. 813

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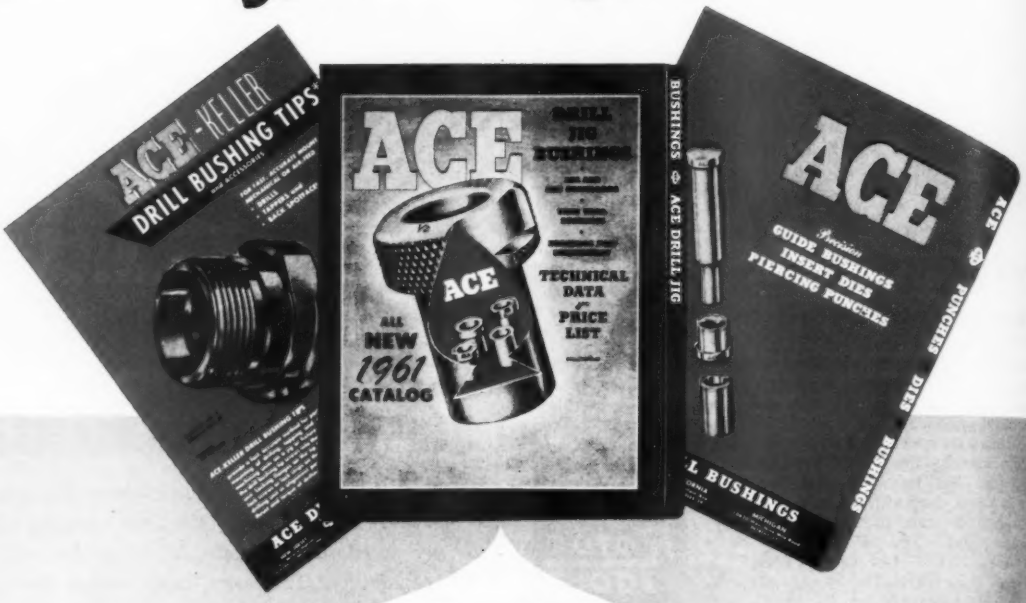

ACE DRILL BUSHING 1961 CATALOG

The Industry's FIRST Drill Bushing Catalog

with ASA Symbols

and ASA Conversion Tables

Here is a complete listing of all A S A unified drill bushing symbols. It's a unique, comprehensive identification system for all standard sizes, designed to prevent errors and provide uniformity in specification, ordering and handling drill bushings. If you have been confused with the multitude of symbols and sizes, your troubles are over. For your benefit ACE has brought the new terminology together in one handy catalog, including a comparison of the markings of all leading makes with the new A S A symbols.

This is the first ALL NEW 1961 DRILL BUSHING CATALOG that is complete in every detail. You'll find many pages of separate listings for ground and unground standard, micro and supersizes, Thin Walls and Bushings for Embedment. Over 25,000 listed sizes, 6000 comparative symbols, technical data on all types, list prices and quantity discounts. For your *free copy*, just mail us a card; print name and address plainly, and say — "1961 Ace Catalogs." You'll receive them promptly.

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7	19	31	63	80	671	782	932	954	981	1011	1053	1094	
8	20	32	66	82	672	783	933	955	982	1012	1061	1111	
9	21	33	68	83	673	811	934	956	991	1013	1062	1112	
10	22	34	69	88	731	812	941	957	992	1021	1063	1113	
11	23	35	70	89	732	813	942	961	993	1022	1064	1121	
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C3	C11	C19	C27	C35	C43	D1	P3	P11	P19	P27	P35	P43	P51
C4	C12	C20	C28	C36	C44	D2	P4	P12	P20	P28	P36	P44	P52
C5	C13	C21	C29	C37	C45	D3	P5	P13	P21	P29	P37	P45	P53
C6	C14	C22	C30	C38	C46	D4	P6	P14	P22	P30	P38	P46	P54
C7	C15	C23	C31	C39	C47	D5	P7	P15	P23	P31	P39	P47	P55
C8	C16	C24	C32	C40	C48	D6	P8	P16	P24	P32	P40	P48	P56

Which article interested you most?

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6	17	30	61	79	116	781	931	953	974	1003	1052	1093	
7	19	31	63	80	671	782	932	954	981	1011	1053	1094	
8	20	32	66	82	672	783	933	955	982	1012	1061	1111	
9	21	33	68	83	673	811	934	956	991	1013	1062	1112	
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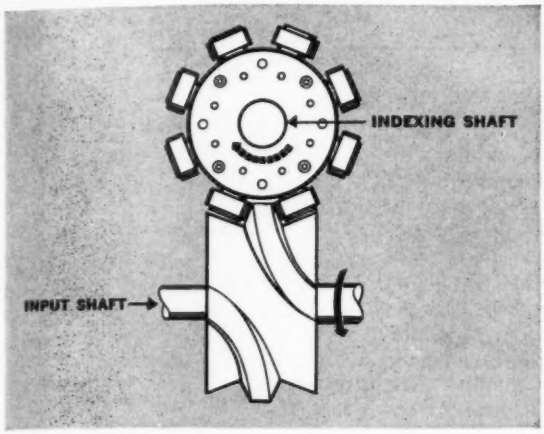
C5	C13	C21	C29	C37	C45	D3	P5	P13	P21	P29	P37	P45	P53
C6	C14	C22	C30	C38	C46	D4	P6	P14	P22	P30	P38	P46	P54
C7	C15	C23	C31	C39	C47	D5	P7	P15	P23	P31	P39	P47	P55
C8	C16	C24	C32	C40	C48	D6	P8	P16	P24	P32	P40	P48	P56

Which article interested you most?

How Ferguson *ELIMINATES BACKLASH* in Index Tables

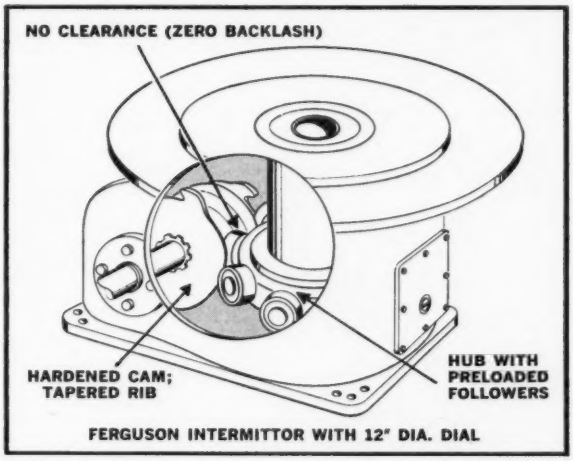
Backlash in indexing results in shock loads that affect the efficiency of a machine and the quality of its product. Most indexing mechanisms have inherent characteristics that cause backlash and poor dynamic conditions and prevent the designer from taking full advantage of modern feeds, tooling and methods that contribute to production economy.



Ferguson Intermittor Index Tables have inherent zero backlash and extreme precision which results in a rotary transfer machine base capable of operating speeds up to 500 indexes a minute. *A Ferguson index table never proves to be a limiting factor in the speed or performance of an automatic assembly machine.*

HERE'S WHY: The continuously rotating cam of a Ferguson indexing mechanism features a *tapered rib* along which two preloaded bearing followers roll, maintaining constant contact with no clearance between them and the rib. When the mechanism is in the rest, or dwell, position, a straight portion of the rib locks the followers with zero backlash and an indexing accuracy of .001". Wear on the hardened tool steel cam is infinitesimal (many have been in use for more than 25 years). Followers are rated for a minimum of 8,000 hours operation. If backlash occurs after this period the life of the drive may be renewed merely by replacing the standard followers.

NOTE HOW PRELOADED FOLLOWERS ENGAGE RIB



FERGUSON INTERMITTOR WITH 12" DIA. DIAL

Compare this with other types of indexing devices. A geneva drive, with its slotted wheel and driver, and a barrel cam with a grooved track which engages one follower at a time, must have clearance in the slot or groove to allow passage of the follower. The slightest amount of clearance causes backlash. As the slot or groove wears, the clearance becomes greater and the backlash condition worsens. At the higher, more profitable operating speeds poor dynamics cause wear on other parts of the machine. The user must choose between frequent downtime for repairs or slower speeds . . . He is the loser in either case.

FREE DESIGN DATA — Load ratings, dimensions and application and installation information about standard and stock Intermittors, Ferguson Drives and in-line machines are contained in a single 36 page catalog. Every designer should have one in his library . . . Write Ferguson—Ask for Catalog No. 160.

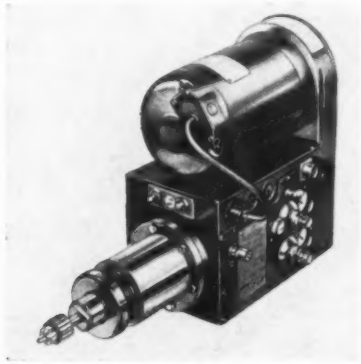
FERGUSON
MACHINE CORPORATION
A subsidiary of Universal Match Corporation
7818 Maplewood Court • St. Louis 17, Missouri

CIRCLE INFORM-A-GRAM KEY NO. 83

Product News

High-Speed Drill

Spindle speeds from 800 to 15,500 rpm for production of small holes from approximately 0.020 to ¼" dia will be facilitated with new high speed automatic drill units. According to the Dumore Co., 1300 17th St., Racine, Wis., these high speed drill units are also applicable to spinning or small rivets and



friction welding operations. The Dumore units are actually automatic machine tools complete with motor, traversing spindle and built-in controls, nose mounting bracket, complete self-contained control system and control drill advance and retract rate. Write for Bulletin HSD-161, or mark Inform-A-Gram No. P1.

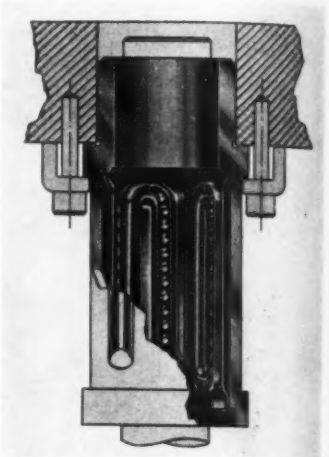
Grinders And Buffers

A lower noise level than previous models, and a 75% power increase are two outstanding features of Series 74G heavy-duty grinders and buffers by Buckeye Tools Corp., 5003 Springboro Pike, Dayton 1, Ohio. Maximum capacity is an 8" organic wheel or a 6" wire brush at 4500 rpm. Other ratings are 9000 rpm for 4" wheel,

7200 rpm at 5" and 6000 rpm with 6" wheel. Maximum weight is 10-7/16 lbs and maximum length measures 19-1/4". Write directly to manufacturer, or circle Inform-A-Gram No. P3.

Die-Set Ball Bushing

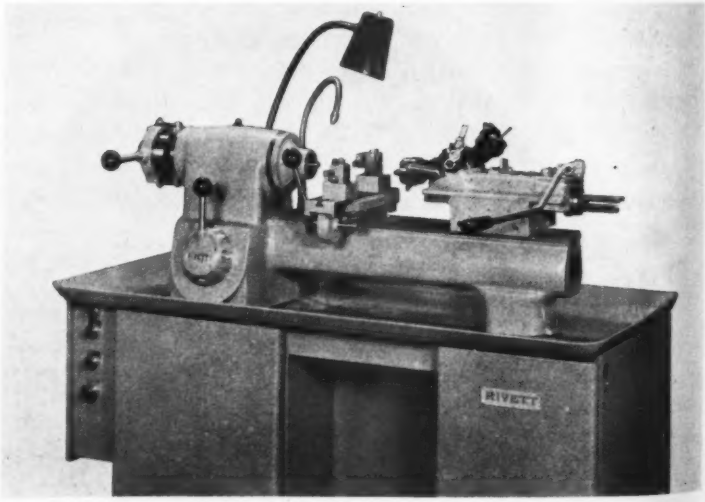
Opposed to regular bushings the new ball bushing is equipped with a pilot dimensioned to fit the mounting hole in standard punch holders. Longer than conventional length, and a reinforced outer sleeve, give greater load capacity and prevent deflection. An integral wiper seal sweeps metal scrap and atmospheric contamination from guide pins. Lubricant retention for long press runs eliminates periodic guide pin lubrication. Designed specifically for use on die sets, the ball bushing is interchangeable with standard plain bronze or steel bushings in existing dies. Write Thomson Indus-



tries, Inc., Manhasset, N.Y., or circle Inform-A-Gram No. P4.

Precision Turret Lathe

Greater accuracy and more productivity on initial machining and second operations are assured with a new turret lathe. Made by Rivett Lathe & Grinder, Inc., Brighton 35, Boston, Mass., the lathe stars "one motion control." A single lever starts lathe spindle and selects any speed up to 4800 rpm. The same lever will instantly stop, reverse spindle, or change speed. Some outstanding characteristics are an automatic indexing turret with hardened steel sides, true round and rigid spindle, double-bevel bed, double tool cross slide, three-point mounted bed. No. P2.



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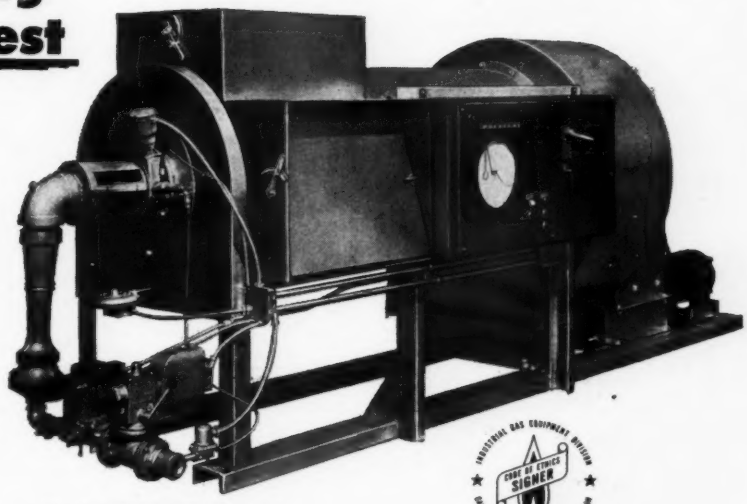

Model 409H illustrated.
Capacity 2,000,000 BTU's/hr.
Complete with controls.

Request complete information.

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Dahlstrom Tap Guide

- *Do precision tapping by hand*
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- *Carry to jobs or fasten to bench*
- *Serves as a handy tap extension*

REDUCE TAP BREAKAGE IN YOUR SHOP!

The Dahlstrom Tap Guide works straight and square to eliminate most costly tap breakage. Anyone can operate it—just slip a tap and adaptor into the spindle and turn the handle. Equipped with nine adaptors from 8-32 to ¾" (taps not furnished) . . . depth of throat 7½", opening 7" . . . 8 x 11¼" table area . . . wt. approx. 32 lbs. Order this tap-protecting time saver for YOUR shop.

Ask for the illustrated bulletin that includes information on the $1.75 Dahlstrom Automatic Stock Feed Stop.

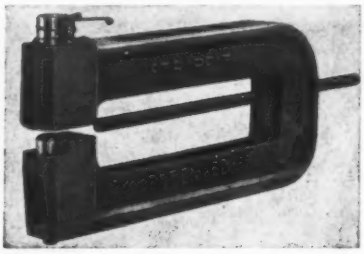
Branch MANUFACTURING COMPANY
16 Olson Drive, North Branch, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 852

Product News

Hole Punching Unit

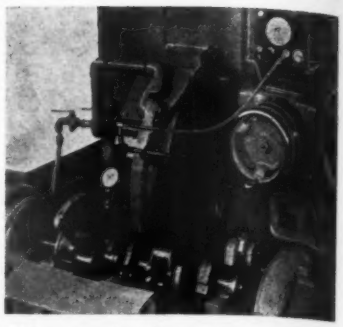
Only a punch and die are required to punch round or shaped holes with new "BN" units. Designed for use with or without guide buttons, the holders permit punching closer to the leg of formed flanges and angles. Self-storing keys allow use of round and shaped punches and dies in the same holder, and the holder



does not have to be removed for rotation or removal of the die. For special applications and for optimum hole quality, choice of fitted or closed guide is still available. More from the manufacturer Wales-STRIPPIT, Inc., 212 So. Buell Rd., Akron, N.Y. Inform-A-Gram No. P5.

Single-Limit Control Gage

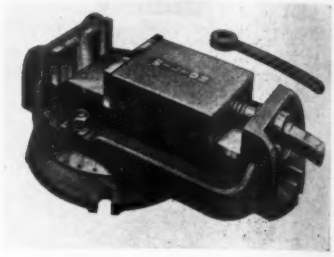
A simplified air-electric unit, that provides effective dimensional control for cylindrical grinders, has been announced by Federal Products Corp., 1144 Eddy St., Providence, R.I. Known as the "Econo-Sizer," it initiates the control signal which retracts the grinding wheel. The system has built-in cushioned response to work size variations, and minor surface irregularities do not affect the control action of the gage. This gage can be installed on any plunge-cut cylindrical grinder with hydraulically-powered wheel



slide mechanism. The "Econo-Sizer" can be supplied with Arnold grinding gage caliper or any suitable caliper designed for air measurement. Write the maker, or check Inform-A-Gram No. P7.

Milling Machine Vise

A new milling machine vise with large cooling trough, replaceable steel gib plate, and reversible steel jaw faces comes in a stationary flanged base model, or with graduated swivel base. Both models have an over-all height of 4¾" and open to a jaw depth of 1-15/16". For more data on this low cost vise, write Wilton Tool Mfg. Co.,



Inc., 9525 Irving Park Rd., Schiller Park, Ill., or circle No. P8.

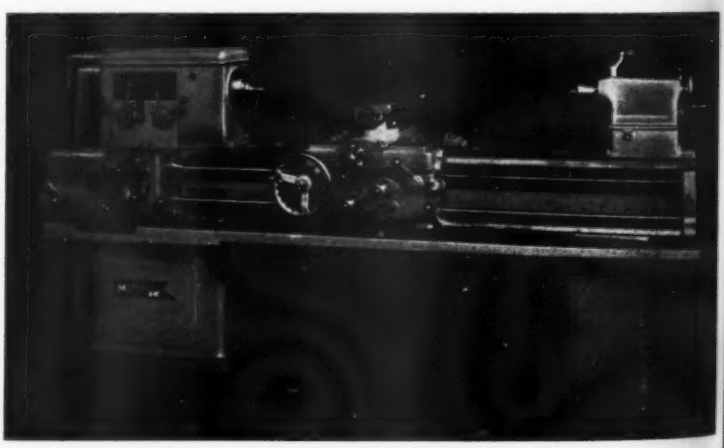
New Filter Design

Certain problems of using magnets with fluid filters have been eliminated with a new filter named "Tell-Tale." Sliding cylinder design places the magnets beyond the screen in the flow where velocity is lowest. Cleaning will be necessary long before metal particles can form clusters. The magnet as-

sembly is attached to the clean-out cover, simplifying cleaning. According to the Rosaen Company, 1776 E. Nine Mile Rd., Hazel Park, Mich., magnets can be included, added in the field, or omitted at will. The company will supply more information, or circle Inform-A-Gram No. P9.

Low Cost Lathe

All conventional turning, boring, facing and thread chasing operations can be done accurately with the field proven Model K "Kompact" lathe by Monarch Machine Tool Co., Sidney, Ohio. Swing over the bed is 16"; swing over the cross slide 10", and center distance measures 54". There are 16 geared speeds in a range of 28 to 1200 rpm. Included in the 48 thread range are all U.S. standard and U.S. fine threads. Feeds/rev range from 0.0012 to 0.070. Write the manufacturer, or circle No. P6.



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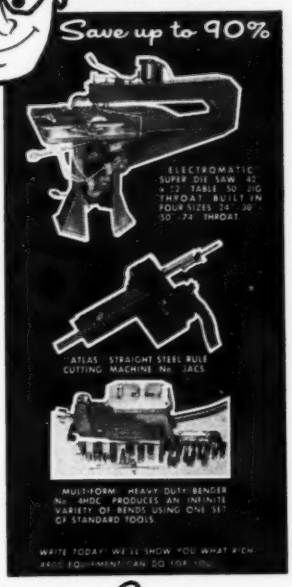
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MULTI-FORM HEAVY DUTY BENDER No. 4HDC PRODUCES AN INFINITE VARIETY OF BENDS USING ONE SET OF STANDARD TOOLS
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HURON MACHINE PRODUCTS INC

P. O. BOX 2274, DEARBORN, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 872

HOLES COST LESS

when drilled with ELDORADO* GUN DRILLS:

Eldorado Gun Drills are your best guarantee for excellent surface finish and top quality performance in gun drilling flawless, straight, round, accurately located holes at high speeds in **one single operation.** Each Eldorado Gun Drill is precision made to exacting specifications by gun drill specialists. Gun drill making is our business, our only business

With hole after hole, in drilling steel, iron, aluminum or other alloys, at speeds and feeds impossible with other types of drills, Eldorado drills cut costs in time, labor, tools, materials and maintenance.

There's an Eldorado Gun Drill for your job! Immediate delivery from factory stock. We invite you to talk over your 'hole' problem, at no obligation.

Send for NEW LITERATURE on Gun Drills and Gun Reamers.

ORDER STOCK SIZES FOR IMMEDIATE SHIPMENT. TO SPECIFICATIONS, ON NORMAL DELIVERY.

MADE TO YOUR SPECIFICATIONS:		AVAILABLE FROM STOCK:	
Sizes	.1250" to 2" dia.	1/8" to 1/2" dia. in 64ths	1/2" to 3/4" dia. in 32nds
OA Lengths	4" to 120" with dia. limits	10", 16", 22", 36"	16", 22", 36"
Drivers	Std. or to fit your need	.750" dia. x 2 3/4" long	1" dia. x 2 3/4" long
Tips	Carbide	Carbide	Carbide

Now, order from stock, or send in your specifications for a prompt quotation.

Specialising 100% in Gun Drills and Related Tools.

ELDORADO TOOL & mfg. corp.

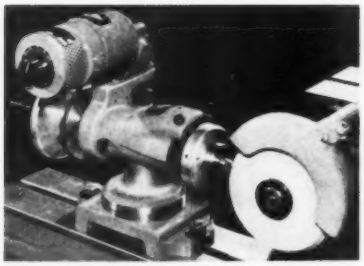
356 BOSTON POST ROAD • MILFORD CONN

CIRCLE INFORM-A-GRAM KEY NO. 873

Product News

New Grinding Fixture

Accurate grinding of drill points plus the simplest approach to cam-relief shaping and sharpening of a variety of tools is the dual purpose of a new grinding fixture. As a drill point grinder the range covers 128 sizes from #80 through 1-1/32". One infinitely adjustable cam is employed for right and left hand operation and there is no limit to the number of flutes. Harig-Steptool Co., 5757 W. Howard St., Chicago 48, Ill. will supply additional pointers. Or check Inform-A-Gram No. P10.

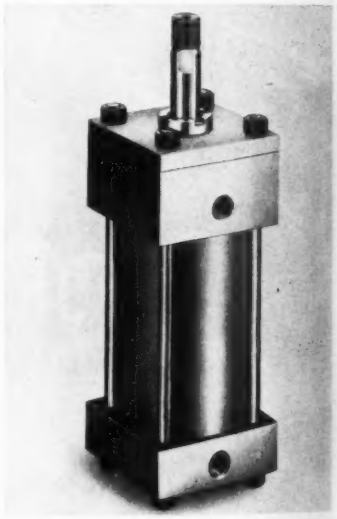


Plastic Filler

Repairing of small molds and dies, filling rough spots in castings, and sealing leaks in storage tanks, will be simpler with Magic Bond. The new polyester resin plastic filler and hardener adheres firmly to metal, wood, plastic and other materials. Magic Iron and Cement Co., Inc., 14215 Caine Ave., Cleveland 28, Ohio, claims the substance will not rust, corrode, shrink, flake, chip or peel. Find out more by writing the makers, or mark Inform-A-Gram No. P11.

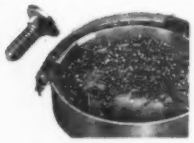
Interchangeable Cylinder

A new interchangeable cylinder for 250 psi air, and up to 2500 psi oil service has been introduced at an economy price by Alkon Products Corp., 200 Central Ave., Hawthorne, N.J. Premium features include low-friction nylon piston bearings, case-hardened piston rods, chrome-plated barrels, and piloted, quick-change rod packing cartridges. The chrome-plated alloy steel piston rod, with 125,000 yield strength, is ground and polished to a 2 rms finish to extend seal life and resist impact damage and scoring. Write or check P12.

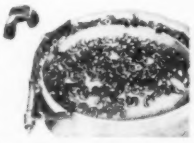


SYNTRON PARTS FEEDERS DO THE WORK OF MANY HANDS
Vertical Vibratory
SYNTRON PARTS FEEDERS

—speed production, increase efficiency of most operations requiring continuous controlled feeding of small parts.
—flexible enough to handle a wide variety of parts—sizes, shapes materials.
—adaptable to most automatic machines. Supply parts in an oriented, single-line at rheostat controlled rates.
—dependable, powered by the world famous Syntron Electromagnetic drive unit, 3600 vibrations per minute, rheostat control, no mechanical wearing parts to replace or maintain.
—custom built, each feeder is engineered to the specific part that is to be handled.
Investigate the possibilities of Syntron Parts Feeders in your parts handling operation.


Feeding special bolts

Feeding special bass parts


Feeding wing nuts

Write today for a Syntron Catalog and complete information about Syntron Parts Feeders.

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SYNTRON
SYNTRON COMPANY
341 Lexington Avenue • Homer City, Pa.

Battery Chargers

Transfer & Storage Parts Feeders

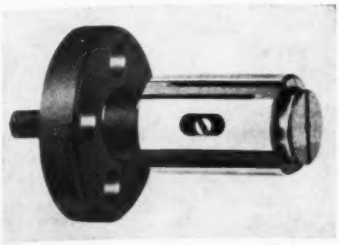
Lapping Machines

CIRCLE INFORM-A-GRAM KEY NO. 88

Product News

Expanding Mandrel

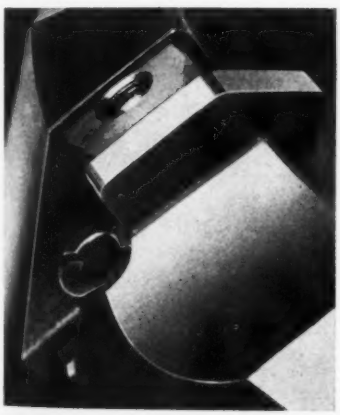
A new expanding mandrel has unusual flexibility due to a unique bushing. The lead spring action permits the bushing to compensate for tapered holes, adjust to various hole sizes, and provide for equal chucking pressure at all



points. Capacities range from 7/16 to 11". Receive additional information by writing to Balas Collet Manufacturing Co., Cleveland 14, Ohio, or mark P13.

Micro-Finishing Blades

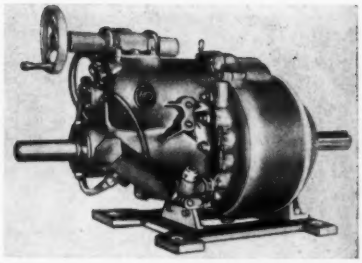
New milling cutter blades furnishing finishes consistently below 50 rms are a development by Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich. Manufactured for use with Wesson cam-pin cutters, the new blade is inserted in the slot with the least



amount of runout so it can be positioned anywhere within the adjustment range 0.030 of the cam pin. Cutting edge of the micro-finishing blade is parallel to the cutter flange at right angles to the spindle, and tends to wipe away cutter marks. For additional information contact manufacturer, or check Inform-A-Gram No. P14.

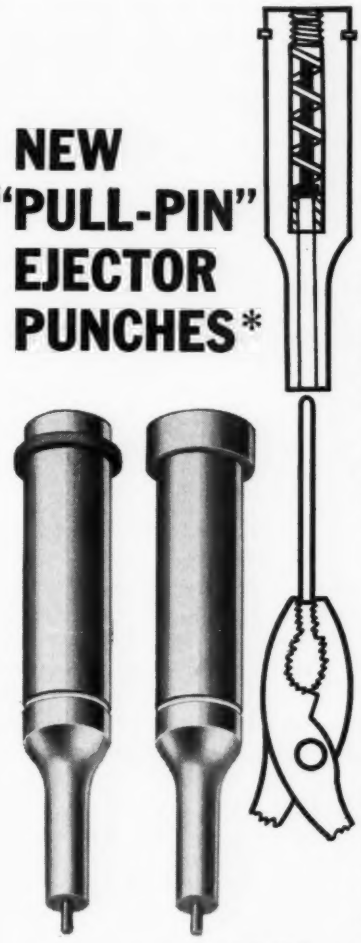
Variable Speed Transmission

A new 10 hp hydraulic transmission with speeds from 0 to 1600 rpm permits low cost automation, modernization of existing machinery, and development of new equipment. Roberts Electric Co., 849 W. Grand Ave., Chicago 22, Ill., points up the compactness, light weight, and ball roller bear-



ings throughout. Write for more information, or circle No. P15.

NEW "PULL-PIN" EJECTOR PUNCHES*



CUT GRINDING TIME 90%

With no special tools—*just pliers*—you can pull ejector pins from punches *in seconds!* Pull-Pin Ejector Punches eliminate the costly procedure of disassembly of punches or removal of stripper plates.

Just pull the pin, depress the stripper, sharpen the punches, push the pin back in. Even closely grouped punches are prepared for grinding instantly.

NEW CATALOG shows round and shaped punches and dies. Information is provided on engineering specifications, material and heat-treating, punch and die clearances, blanking pressures, etc. Ask your distributor, or write direct.

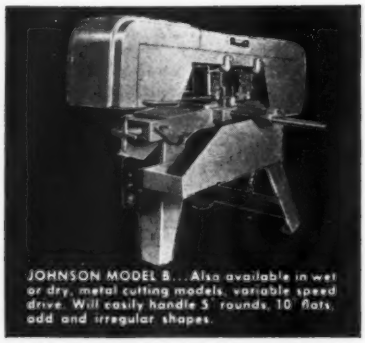
*PAT. PEND.

New line includes Regular, Medium and Long lengths in Ring and head-type punches; complete range of press-fit and head-type stripper bushings; quill punches in 3 sizes.

R RING PUNCH & DIE DIVISION
OF THE PRODUCTO MACHINE COMPANY
JAMESTOWN, NEW YORK
PRODUCTO

CIRCLE INFORM-A-GRAM KEY NO. 89

JOHNSON MODEL J . . . A big, rugged saw that cuts anything—anywhere! 10" rounds, 18" flats, heavy structurals and odd shapes. Available in wet or dry cutting models, variable speed drive and optional equipment.



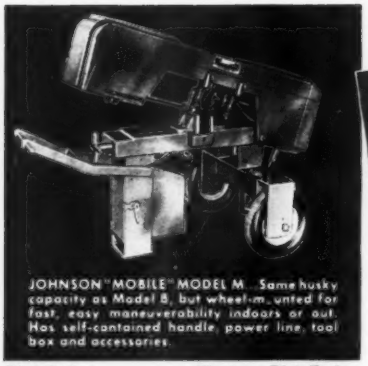
JOHNSON MODEL B . . . Also available in wet or dry, metal cutting models, variable speed drive. Will easily handle 5" rounds, 10" flats, odd and irregular shapes.

Only Johnson offers *all* of the outstanding construction features and performance advantages—*at a lower initial price.*

Why pay more when you can have the best for less? Compare Johnson saws with others costing hundreds more, and you'll find that *only* Johnson delivers the life-long, maintenance-free efficiency you've always wanted.

Immediately available in five high capacity models to meet any metal cutting requirement—efficiently and economically.

JOHNSON ADJUSTABLE STOCK STAND . . . A necessity for operational safety and production efficiency. Solidly built, easily adjusted even under load. Practical and inexpensive.



JOHNSON "MOBILE" MODEL M . . . Same husky capacity as Model B, but wheel-mounted for fast, easy maneuverability indoors or out. Has self-contained handle, power line, tool box and accessories.

Write Today...for your copy of the big, new Johnson catalog. Illustrates and describes all models and accessories.

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Des Plaines, Ill.

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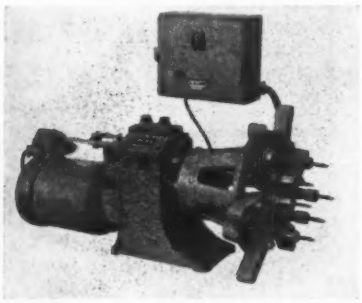
1605 Solano Avenue
Berkeley, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 90

Product News

Tapping Machine

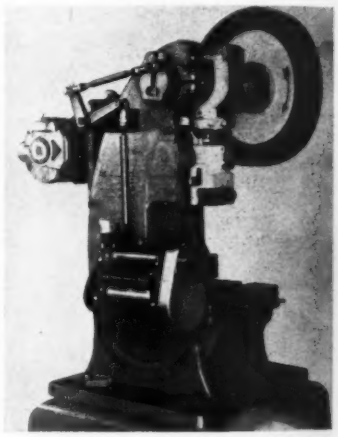
A multiple adjustable tapping machine, with a capacity of six NC ⅜" taps in free cutting steel, is capable of operating singly or in units, from different sides, or in clusters with other machines. According to Columbia Tool & Die Works, 716-39 Ave. N.E., Minneapolis 21, Minn., the "Anoka" machine has been shop-tested for



more than two years. It has six spindles adjustable to any pattern, with a maximum bolt circle of 7½" and a minimum center distance of 1¼". Write to the manufacturer, or mark Inform-A-Gram No. P16.

Precision Roll Feed

A new precision roll feed with adjustable roller pressure, greater feeding accuracy, and a long-life cam clutch has been designed by Benchmaster Mfg. Co., 1835 West Rosencrans Ave., Gardena, Calif. The lower feed roll measures 3⅞" dia, producing a nominal 3½" stock travel with less than 1/3 of the full roll circumference. The series 3.5 PRF employs no gearing and eliminates backlash. For more information write the company, or check Inform-A-Gram No. P17.



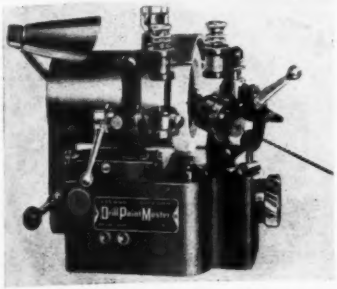
Revolving Stops

A new line of revolving stops for automatic and hand screw machines, made of alloy steel and heat-treated for maximum durability, has been introduced. The head is designed to revolve freely under load, working against a single ball. Units are available with oversize heads, or soft heads for working into special stops. To eliminate shank interference, different lengths are offered by the manufacturer Mueller Industries, 510 E. Rand Rd., Mt. Prospect, Ill. Circle Inform-A-Gram No. P18.

Product News

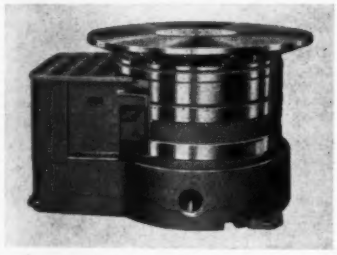
Versatile Drill Grinder

A unique, super precision drill grinder, capable of duplicating any point geometry, has been developed. Among the special features are independent adjustment of point angle from 60° to 180°, lip relief from 0° to 26° and point thinning controlled to thousandths.



Two variable power microscope viewers and a sealed beam assist in precise setting, and all settings can be logged for exact duplication any time. According to Leland-Gifford Co. of Worcester 1, Mass., the "Drill Point Master" produces and reproduces any desired point on any drill from #80 to 0.250 dia. The company will furnish a bulletin, or circle Inform-A-Gram No. P19.

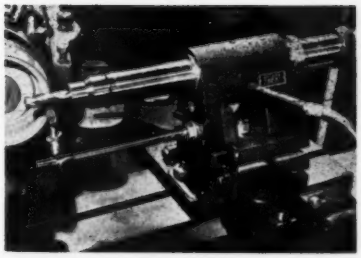
Indexing Machine Chassis



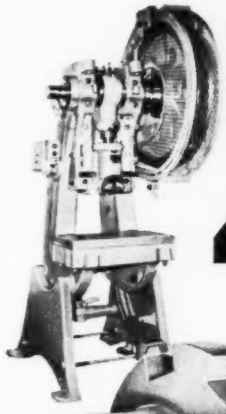
A completely packaged chassis including motor, drive and clutch, intended as a basic unit around which automatic machines can be designed and built, is introduced by Swanson-Erie Corp., 816 E. Eighth St., Erie, Pa. A wide selection of speeds, turret diameters and index positions make the Series H chassis readily adaptable to a broad group of assembly and processing operations. An extension of the main index camshaft provides for mounting operational cams to actuate tooling. Write manufacturer, or mark No. P20.

End-Mill Sharpening Fixture

The precision spindle of a new end-mill sharpening fixture is supported by an air bearing, which allows for minimized friction. The fixture with its smoother, more effortless grinding motion of the spindle, uses air from shop supply from 60 to 90 psi. The fixture mounts directly on the table of any make tool grinder, and the air-bearing-mounted spindle accommodates straight-shank end mills from 3/16 through 1-1/4" dia with



its matched bushing set. Additional data from Weldon Tool Co., 3000 Woodhill Rd., Cleveland 4, Ohio, or circle Inform-A-Gram No. P21.



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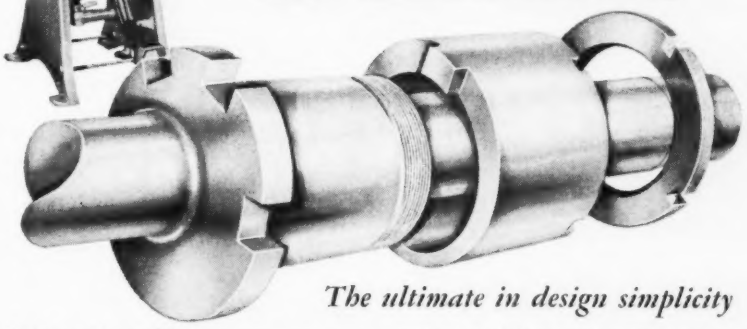
VARISTROKE* *is like having*

4 PRESSES IN ONE!



The ultimate in design simplicity

Only in a Zeh and Hahnemann Press manufactured by Dechert Dynamics Corporation can be found this adjustable Varistroke principle of operation which permits one press to accommodate a work range that would normally take four average presses of different sizes to match.

In addition to a wider work range, the Varistroke principle reduces die travel and slide velocity to a minimum. Because of this, the die set, die, slide, gibs, etc. wear much slower, adding low maintenance cost to the list of features that have made the Zeh and Hahnemann Press line preferred in the field.

Adjustable Varistroke Crankshaft is Simple —Economical

- *only 2 additional parts*
- *costs only a fraction of total press cost*
- *minimum slide velocity*
- *reduces machine and die maintenance*
- *wide range stroke from ½" to 1½" & 1" to 3" on larger presses*

*available on all Zeh & Hahnemann single crank presses only up to 50 ton capacity.

Write, Phone or Wire for complete information...

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DYNAMICS CORPORATION

Palmyra, Pa., TEmple 8-9431 • Newark 5, N. J., BIgelow 3-4747

CIRCLE INFORM-A-GRAM KEY NO. 91

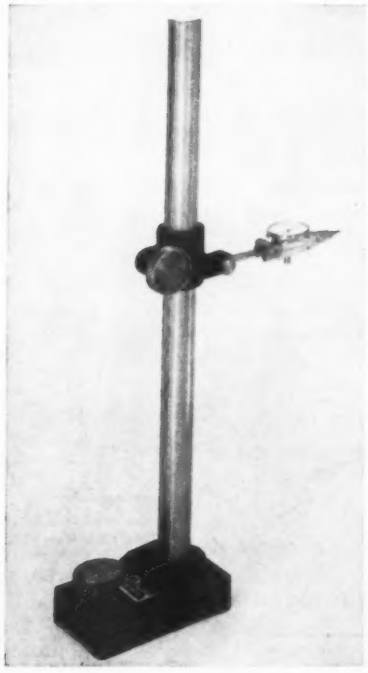
Product News

New Drill Presses

New bench and floor drills are available with choice of positive power and variable speed drive allowing any speed from 500 to 4500 rpm. Five speed drive with spindle speeds from 410 to 5380 rpm is also featured. Other outstanding characteristics are 10 x 14″ precision ground tilting table, massive base with 10 x 13″ ground working surface, positive depth stop, and a front mounted safety switch. Write Clausing Div., Atlas Press Co., 2318 N. Pitcher St., Kalamazoo, Mich., or circle Inform-A-Gram No. P22.

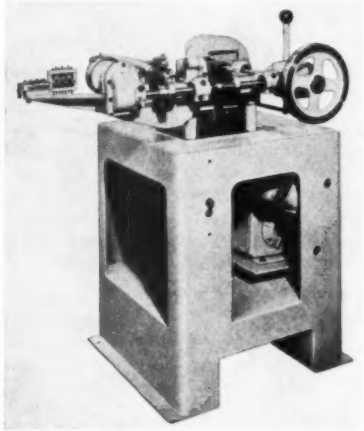
Transfer Stand

The already popular 18″ model Hyt transfer stand by The Van Keuren Co., Watertown, Mass. has been supplemented by a new 24″ transfer stand. Designed and balanced to assure smooth movement without chatter, the stands have chromed posts for fast positioning; smooth precision adjustment is insured through an adjustment knob. Write for folder, or circle Inform-A-Gram No. P23.



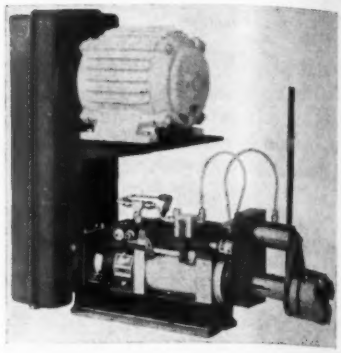
400 Lengths/Min

Machine SC-00 fills the need for straightening and cutting-off short lengths of round wire up to 3″ and in sizes up to 0.045 dia basic wire (to 0.060 soft material), or its equivalent in ribbon metal widths to ⅜″. Lengths are cut-off at 400/min, either square-cut, divergent-cut or a combination of them. Tolerance is held to ±0.002 on feed lengths. With a secondary



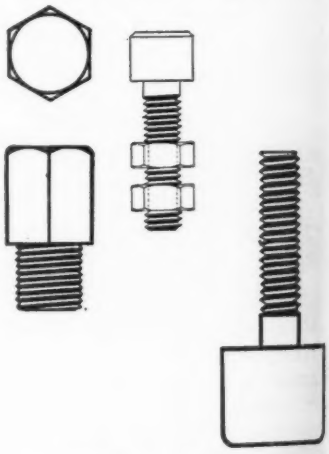
cut-off attachment, tolerance is maintained at zero. Designed by A. H. Nilson Co., 1400 Bridgeport Ave., Shelton, Conn., the machine can be tooled to perform a variety of secondary operations, such as forming, heading, coining or piercing and winding. Contact the company, or mark Inform-A-Gram No. P24.

Air-powered Threading Heads



New air-powered Holomatic self-contained threading units are designed specifically for operation with releasing-type tapping, threading, and thread rolling heads. Using compressed air for actuation and thrust, these units incorporate adjustable cam controls for establishing any length and rapid travel within the stroke limits. Threading and tapping heads from 6-32 to 1-⅛″-12 in mild steel can be operated. Additional data from Hause Machines, Inc., Montpelier, Ohio, or circle Inform-A-Gram No. P25.

Adjustable Locating Buttons



A group of cyanide hardened buttons, made in four sizes with two hexagon nuts to each set, are offered by Reid Tool Supply Co., 332 W. Delano Ave., Muskegon Heights, Mich. They can serve as jig feet, adjusting jacks and machine stops. Write the manufacturer for specifications, and prices or circle Inform-A-Gram No. P26.

heinrich AIR VISES

4 Models—For High Speed Production

3" and 4" jaws open to 3⅛" and 4⅛". Both available with either ⅜" or 1⅞" jaw travel. Hollow base for clear through drilling.

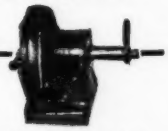
Ratchet adjusting screw for quick positioning.

Recessed parallel jaw inserts level work.

Holding power from feather touch to 15 times air pressure.

Send for BIG, FREE 28-page catalog.

Foot Treadle Control for hand-free operation.



HEINRICH AIR CLAMP No. 55

Same holding power and fast setting as Heinrich Air Vises. Height 6⅛", width 5¾". **Price . . . Only $29.50**

HEINRICH TOOLS INC.
Dept. 131-B
Racine, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 931

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ALL NEW — Complete specifications and cost saving data on over 2000 "Standards", including world's largest line of work-holding equipment, chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, plus hundreds of other jig and fixture components. Detailed specifications, engineering drawings. The one complete source for data on all the "standards" for tool, die, jig, and fixture design and application.

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CIRCLE INFORM-A-GRAM KEY NO. 933

"Raymac"

SOLID CARBIDE CUTTING TOOLS

- MIDGET BURRS • ROTARY FILES
- DRILLS • REAMERS • END MILLS
- COUNTERSINKS • GRINDING

TOOLS AND OTHER SPECIAL TOOLS

Up to 25% Longer Life

Finest quality solid carbide ground and lapped to the sharpest cutting edges make "Raymac" tools the quality standard of the industry. More parts produced per tool and per regrind.

Make "Raymac" your standard.

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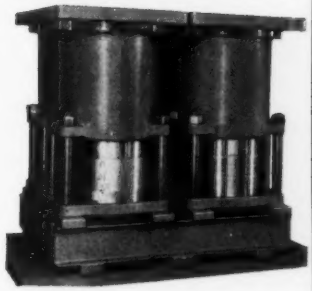
"Raymac" Division – DEXCO CORPORATION
15778 Telegraph Rd. Detroit 39, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 932

DIE CUSHIONS

by
DAYTON ROGERS

for ALL PUNCH PRESSES



Accurate working pressure on all dies.

Standard or designed for job.

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CAM milling/JIG boring

A SPECIALIZED CAM MILLING SERVICE, JIG BORING, SPOT WELDING, CONTRACT PRODUCTION

EXPERIMENTAL DEVELOPMENT

CAM CALCULATING SERVICE

Write for catalog 55-C

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Chas. Eisler, Jr., President
732 So. 13th St
Newark 3, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 941

MINIATURE
DRILL BUSHINGS
Hole Sizes—No. 80 to 3/32"
O.D. 3/32" to 13/64"
Lengths 1/4" to 3"
.0002 Tolerance on I.D.
O.D., and Concentricity
Specials to your specifications
WRITE FOR CATALOG
PREBCO BUSHING CO.
14714 East Arrow Hwy., Baldwin Park, Cal.

CIRCLE INFORM-A-GRAM KEY NO. 942

MAGNETIC BASE INDICATOR HOLDER

Model 200B—Price $6.95

¼" dia. non-magnetic stainless steel rod complete with 5/16" and ⅜" O.D. bushings. Fine precision adjustment identical to surface gage. Hardened ball socket setting permits universal positioning.
Powerful 50-lb. pull magnetic base insures firm grip on any ferrous surfaces curved or flat.
Write for Catalogue #958
CULLEN MANUFACTURING CO., INC.
1603 Washington Ave., Racine, Wisc.

CIRCLE INFORM-A-GRAM KEY NO. 943

LIFTING DEVICES

for
FAST • SAFE • BETTER
Material Handling
of
• SHEETS
• COILS • BOXES
• MOLDS
• DRUMS • PALLETS
400 MODELS
H. L. BUSHMAN CO.
100-A W. Central Ave.
Roselle, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 944

KELLER
Die Filers
Deluxe $159.00

3 MODELS
ECONOMY—4 Way tilting table, with motor, $119.00
STANDARD—Has file roller support, with motor, $139.00
DELUXE—Has reciprocating vertical slide, with motor, $159.00

Sutes Service Mfg. Co.
2361 University Avenue
St. Paul 14C, Minnesota

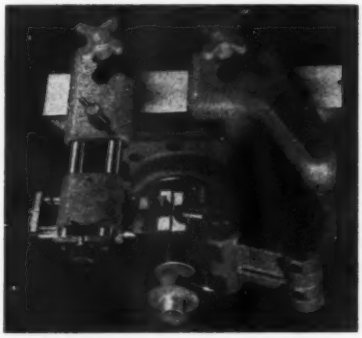
Ask your Industrial Distributor or write TODAY for BULLETIN 660

CIRCLE INFORM-A-GRAM KEY NO. 945

Product News

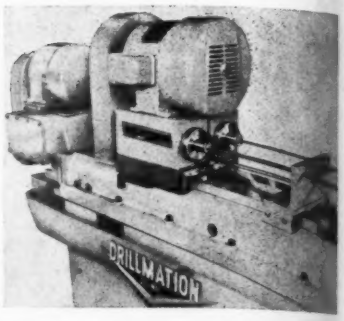
Contour Wheel Dresser

A spindle-mounted contour wheel dresser will handle wheels from 7" dia x 4" wide, down to the smallest mounted wheels. The spindle-mounted unit Model SMD-704 can be left on one machine, or moved to another at will and is manufactured by the Tracaform Corp., 11380 Kaltz, Warren, Mich.



The mounting casting is bored to fit a 3" dia standard spindle, and the bore is sleeved down to fit smaller dia spindles or can be bored to fit spindles up to 3¼" dia. Write the manufacturer for additional data or circle No. P27.

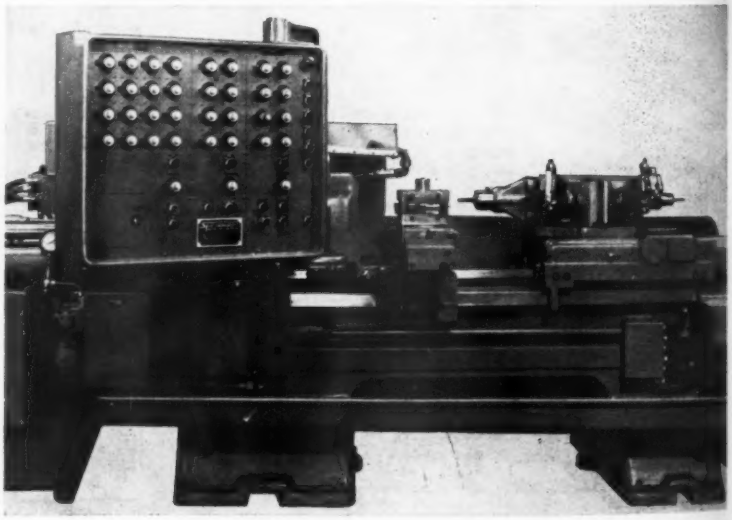
Dual-Spindle Drilling Unit

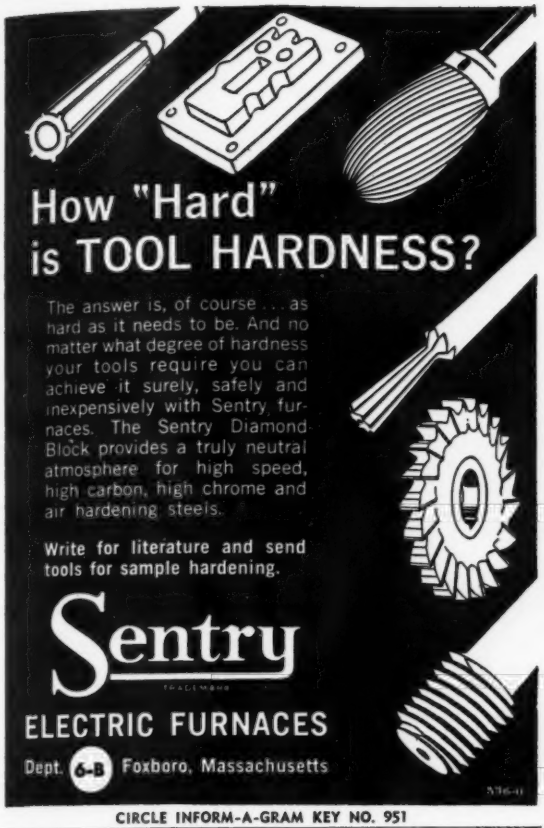


Boremation, a new dual spindle gun drilling power unit, is hailed to slash production time in half on certain operations. Finished holes can be drilled from solid materials, (in one pass) on a production basis. Diameter to length ratios as high as 288 to 1 are possible with a minimum runout of 0.0003/in. Positive drive feed rate will not vary once set, even while drilling through hard or soft spots. Infinitely variable feed rates from 0.0001 ipr to 30 ipm can be coordinated to operate with spindle speeds up to 10,000 rpm, according to Drillmation Co., Inc., 6500 E. Eleven Mile Rd., Center Line, Mich. Inform-A-Gram No. P28.

Shopman's Numerical Control

Human error and the drudgery of manual operation are eliminated with "shopman's control system," which requires no external programming of tape or cards, and is offered by Specialties, Inc., Skunk's Misery Rd., Syosset, L.I., N.Y. Designed for short runs, setups can be completed in approximately half the time required on conventional turret lathes. All programming functions are labeled in the machinist's language. For additional information, circle P29.




How "Hard"
is TOOL HARDNESS?
The answer is, of course . . . as hard as it needs to be. And no matter what degree of hardness your tools require you can achieve it surely, safely and inexpensively with Sentry furnaces. The Sentry Diamond-Block provides a truly neutral atmosphere for high speed, high carbon, high chrome and air hardening steels.
Write for literature and send tools for sample hardening.
Sentry
ELECTRIC FURNACES
Dept. 6-B Foxboro, Massachusetts

CIRCLE INFORM-A-GRAM KEY NO. 951

91

AIR-MITE
PRODUCTION AIR PRESSES

ONE MANUFACTURING SOURCE FOR PNEUMATIC AUTOMATION COMPONENTS
- Cylinders
- Presses
- Valves
- Filters
- Regulators
- Lubricators
- Fittings
- Hose

- Any length column
- Any length stroke
- ¼, ½, ¾, 1 Ton capacities
- Special adaptations available

Air-Mite Production Air Presses are ruggedly built for high production applications. Solid steel column for greater strength and rigidity; compact, powerful cylinders have long, maintenance-free construction features that insure uninterrupted service. Available with a variety of controls for fast, safe operation. Press shown is equipped with two Air-Mite 3-way valves — 1 normally "closed", 1 normally "open." Cylinder will not return for second stroke unless both valves are released.

Write for complete Air-Mite catalog which illustrates and describes the Air-Mite line.

AIR-MITE DEVICES, INC.
4405 AW Kinzie St., Chicago 24, Ill

CIRCLE INFORM-A-GRAM KEY NO. 952

TRIAL SAMPLE!
SPECIAL LUBRICANT EASES WORKING STAINLESS AND TOUGH METALS

New lubricant eases stamping and machining operations on the toughest metalworking jobs—takes the problems out of hard-to-work metals such as stainless, high carbon, high chrome, cast iron, monel, etc. Scientifically developed ANCHORLUBE now used extensively in a wide range of applications—drilling, tapping, spot facing, counter-boring, milling, fly-cutting, seat forming, engraving, broaching, drawing, piercing, punching, hole extruding, etc. Application by swab, spray, roller or brush. Send today for free trial sample and see for yourself how easy you can work the job with ANCHORLUBE.

ANCHOR CHEMICAL COMPANY
Dept. TP-2 • 10721 Briggs Rd. • Cleveland 11, O.

CIRCLE INFORM-A-GRAM KEY NO. 953

SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand — sizes 3/32" to ½" by 1/64" plus handy 17/32" size—length 4⅞". PRICE only $19.40

Single sizes available.

R. L. SPELLMAN CO. • Urbana, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 954

LEAD HAMMERS—Buy Cook "SHUR-GRIP"

They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop forged handles.

Write for circular and prices

COOK'S LEAD HAMMER SERVICE
48 Massasoit Ave., E. Providence 14, R. I.

CIRCLE INFORM-A-GRAM KEY NO. 955

FASTER DIRECT READING ACCURACY

STAINLESS STEEL DIAL VERNIER CALIPER

Model A—cross jaws & thumbroll (internal) and Model B—straight jaws & thumbroll (external). 6"—$42.40; 8"—45.60; 12" — 64.10. Price includes case. Write for literature. Dealers invited.

MOHAWK FILE AND TOOL COMPANY — IMPORTERS
494 Franklin Street • Buffalo 2, New York • TT3-9094

CIRCLE INFORM-A-GRAM KEY NO. 956

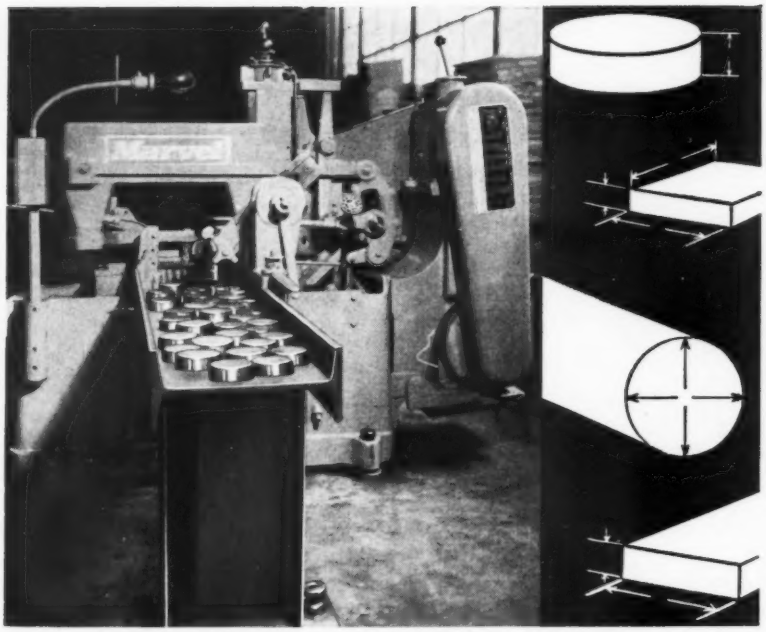
You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work now—save money too!

HEIMANN MFG. CO. • URBANA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 957



ACCURATE

A hack saw blade, like any other cutting tool, must be rigidly held (tensioned) if it is to cut-off accurately. Also, the point at which tension is applied is important to accurate work. Two reasons why Marvel High-Speed-Edge Hack Saw Blades can make any hack sawing machine cut-off more accurately are:

1. They can be tensioned from 200% to 300% more tautly than ordinary blades with complete safety to the operator and the machine because they are unbreakable.
2. Location of the pin holes, by which the blade is held in the saw frame, concentrate these higher tensions at the working edge of the blade.

Ask for Marvel High-Speed-Edge Hack Saw Blades by name and you can be sure you're getting the unbreakable blades designed to give you maximum accuracy, speed and safety in your cutting-off operations. Leading Industrial Distributors have Marvel Blades in stock.

Write for latest Cutting Tool Bulletin and the name of your nearest Marvel Distributor.

MARVEL Metal Cutting SAWS BETTER MACHINES BETTER BLADES

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 961

Producto's New DIE ASSEMBLER

Hydraulically actuated lift table; upper platen revolves 360°, develops 3000-lb. closing force and 1500-lb. separating force. Battery-driven; mobile, no trailing wires. Invaluable in the manufacture and repair of dies. Write today:

TOOLROOM EQUIPMENT DIVISION

THE PRODUCTO MACHINE COMPANY

945 Housatonic Ave., Bridgeport, Conn.

CIRCLE INFORM-A-GRAM KEY NO. 962

DYKEM STEEL BLUE

Stops Losses making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench. metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

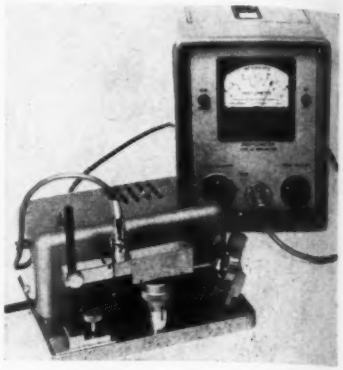
THE DYKEM COMPANY

2303L North 11th St. • St. Louis 6, Mo.

CIRCLE INFORM-A-GRAM KEY NO. 963

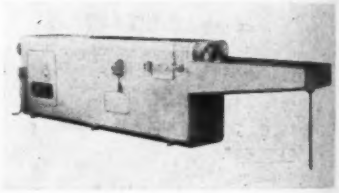
Product News

High Production Checking



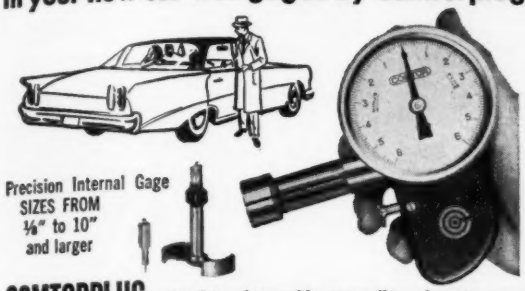
Average surface roughness in micro-inches around rotation surfaces can be checked with the new Profilometer RE rotary pilotor. Reciprocating and continuous tracing motion are provided, making the pilotor adaptable to a wide range of parts. Surfaces of rotation from approximately 1/32 to 2", or more, can be handled with ease, and any desired arc of trace from 10 to 350° with automatic reversals can be selected. The pilotor is to be used with a standard Profilometer amplimeter and tracer, according to Micrometrical Mfg. Co., 3621 S. State Rd., Ann Arbor, Mich. Inform-A-Gram No. P30.

Horizontal Broach



This machine answers the need for an economical, large capacity heavy duty unit. Model H1560 has a 15 ton capacity and up to 60" of cutting stroke. Fully variable cutting speeds up to 22 fpm and 60 fpm while return stroke is at high speed. Fully self-contained in an all steel housing, the broach utilizes heavy chassis type construction. It's adaptable for either surface or internal broaching. Over-all size is 144" long, 33½" wide and 46" high. Further information available from Pioneer Broach Co., 6434 Telegraph Rd., Los Angeles 22, Calif., or No. P31.

The odds are 2 to 1 that the transmission in your new car was gaged by Comtorplug



Precision Internal Gage
SIZES FROM
⅛" to 10"
and larger

COMTORPLUG with interchangeable expanding plugs to gage simple or special holes from ⅛" to 10" diameter.

UNIQUE ADVANTAGES

Shows exact size, with large graduations easily read within .0001".
Detects front or back taper, ovality, bell mouth, barrel shape.
A fixed — not passing — reading.
Automatic features assure uniform gaging free of user influence.
Genuine 2-point gaging, automatically aligned and centered.
Used at machine . . . on work still in chuck . . . at bench . . . on floor.
Free from wires, hose, electronic gear.

In the majority of U. S. cars, this unique 2-point gage is at work — also in jet engine, home appliance, electric motor and other volume-precision programs.

Especially valuable AT THE MACHINE because at moderate cost it gives automatic precision within .0001" and enables you to get maximum results from your precision equipment.

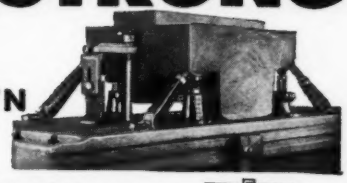
GET THE FACTS **Request BULLETIN 50** →
The **Comtor Co.**, 82 Farwell Street, Waltham 54, Mass.

COMTORPLUG

CIRCLE INFORM-A-GRAM KEY NO. 971

ARMSTRONG

SET-UP *and* **HOLD-DOWN TOOLS**



ARMSTRONG Set-up and Hold-down Tools reduce setting-up time—keep men and machines producing. Designed for use on planers, drill presses, milling machines, etc., they hold work securely and rigidly, and thereby reduce spoilage and prevent costly accidents.

Your local Armstrong Distributor carries ARMSTRONG Set-up and Hold-down tools in stock in sizes for every operation. Stop haphazard setting-up methods. Provide each of your machines with a full complement of ARMSTRONG Set-up and Hold-down Tools.

Write for circular

ARMSTRONG BROS. TOOL CO.
5220 W. Armstrong Ave., Chicago 46, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 972

SOPKO
Grinding Wheel ADAPTERS
TOOLROOM ACCESSORIES

FREE Catalog

- For Use on All Popular Surface Tool and Cutter Grinders
- Precision-made, Hardened & Ground with Heat Treated Nuts
- Complete Line—4 New Models of Adapters Available
- Large Stocks—Immediate Delivery

SOPKO ADAPTERS
Save Time and Money

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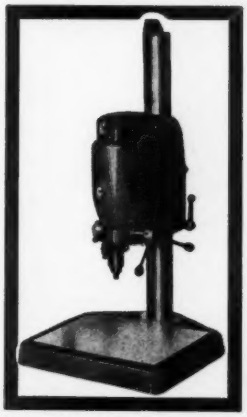
WM. SOPKO & SONS CO.
140 E. 267th ST. • EUCLID 32, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 973

Announcing . . .

the E-M 605
PRODUCTION DRILL PRESS
at new LOW PRICE!



- EXCLUSIVE E-M DRILL-MATERIAL CHART
- FINGERTIP SPEED SELECTOR DIAL
- INSTANT-SET QUILL DEPTH STOP
- BUILT-IN MOTOR
- HEAVY CONSTRUCTION

Designed especially for those production jobs requiring a wide range of work plus accuracy and speed. Includes many features of the popular E-M Tool Room Model. 600 to 4,000 RPM. Table and Bench Models.

THE ELECTRO-MECHANO CO.
260 E. Erie Street, Milwaukee 2, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 974

Have you looked into Drill Press Automation?

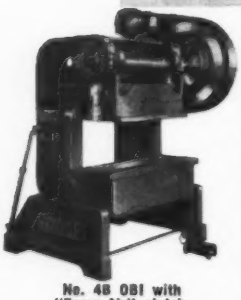
Increase your PROFIT and PRODUCTION 200% and more by equipping your Drill Presses with GENERAL AUTOMATIC DRILL FEEDS.

Write for FREE literature

GENERAL TOOL DIVISION
THE GENERAL FIRE EXTINGUISHER CORP.
8740 Washington Blvd., Culver City, Calif.

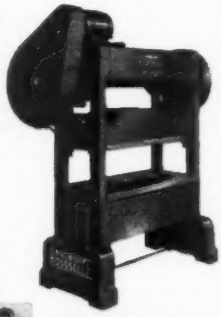
CIRCLE INFORM-A-GRAM KEY NO. 981

High-Output with ROUSSELLE
DOUBLE-CRANK PRESSES



No. 48 OBI with "Econo-Air" clutch.

SPEED UP PRODUCTION with these versatile 40-ton presses. Large bed and ram areas make them ideally suited to handle wide rolls or sheets . . . do multiple punching, steel-rule die work and other high output operations. For rapid, shockless starting and stopping, presses can be equipped with electrically controlled "Econo-Air" friction clutch . . . Ask for new catalog.



Choice of over 30 models and types in 9 to 60-ton sizes

STRAIGHT SIDE – Die space up to 24 in.; bed space up to 6 ft. between uprights.

SERVICE MACHINE COMPANY
Mfrs. of Rousselle Presses
2310 WEST 78TH STREET • CHICAGO 20, ILLINOIS

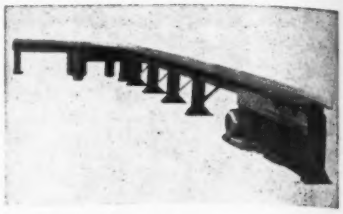
Rousselle Presses are sold exclusively through Leading Machinery Dealers.

CIRCLE INFORM-A-GRAM KEY NO. 982

Protect Your Future
Buy United States Savings Bonds.
Ask about the Payroll Deduction Plan Today!

Product News

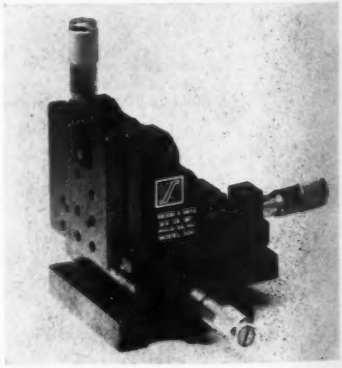
Materials Handling System



A multiple carrier system, using 90° turns, could serve as a sole means of conveyance; starting with the raw material and continuing through shipping. It is adaptable to nearly any application where solid materials can be conveyed on a horizontal plane. Named "Live-Flo," and manufactured by Mathews Conveyer Co., Ellwood City, Pa., the system is said to reduce handling and rehandling of parts. Racks, pans and storage bins are eliminated and a continuous flow of work to point of use is assured. For further information circle Inform-A-Gram No. P32 or write the manufacturer.

New Measuring Device

The K & S Micro-Positioner is suitable for accurate control of tool or part movement during production. It has a range of 0.500 in both horizontal and vertical plane, 0.001 micrometers standard and 0.0001 and metric micrometers to special order. Three precise micrometer



assemblies insure steady measured movement up to ½", and horizontal and vertical face plates contain holes for mounting tooling or other devices. Kulicke & Soffa Mfg. Co., 1234 Callowhill St., Philadelphia 23, Pa. will furnish additional data, or check No. P33.

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All Makes · All Models

WE SATIN CHROME FINISH EVERY MICROMETER AT NO EXTRA CHARGE

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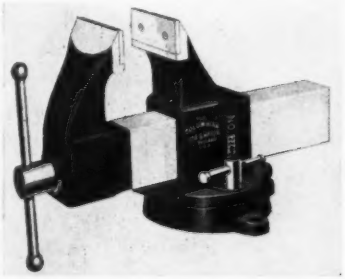
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Penna.

CIRCLE INFORM-A-GRAM KEY NO. 992

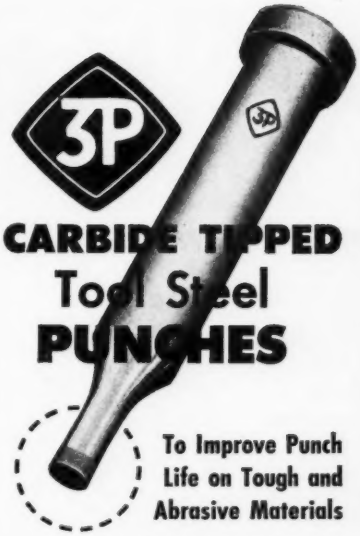
Sheet Metal Workers' Vise

An improved sheet metal workers' vise, with replaceable steel jaw face and malleable iron unbreakable castings has a swivel base which permits it to be swung freely and locked in any desired position. A steel clamping nut operates a forged steel bolt with



teeth that mesh into gear-like corrugations in the base plate to form a positive lock. Columbian Vise & Mfg. Co., Cleveland 4, Ohio will furnish Catalog 60, or circle Inform-A-Gram No. P56.

3P



CARBIDE TIPPED Tool Steel PUNCHES

To Improve Punch Life on Tough and Abrasive Materials

In an exclusive process, Porter Precision Products WELDS Tungsten Carbide to tool steel. These punches are made to approved ASTE Standards. PORTER GUARANTEES THE STRENGTH OF THE WELD TO EQUAL THE STRENGTH OF CARBIDE ITSELF. The carbide will not come off.

3P Carbide Tipped Punches give longer wear life; can be used in your present steel dies. Available from stock—immediate delivery. Write for 3P Catalogue No. 200.

Porter Precision Products
P.O. BOX 208
CINCINNATI 15, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 993

HOLES

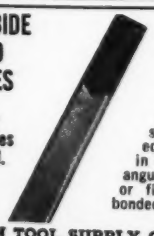
HIGH-PRODUCTION
CLOSE TOLERANCE IN ONE PASS

Clark "HOLE MILLS"
P. O. BOX 990 BEVERLY HILLS, CALIF.

CIRCLE INFORM-A-GRAM KEY NO. 994

CARBIDE HAND HONES

Dealer inquiries invited.



For sharpening and honing—tool room or "on the machine dressing" — of all carbide and steel tools. Selected Boron Carbide in flat, round or triangular shape—coarse or fine grit securely bonded to alloy handle.

TITAN TOOL SUPPLY CO.
Box L, 1419 Hertel Ave., Buffalo 16, N. Y.

ADJUSTABLE SCRAPER-BURRING TOOL

Ideal adjustable vest pocket tool for all burring applications. Replaceable double end, Hi-speed Tool Steel Blade—4-1/2" overall. Ideal for light metal burring.

Write for complete information and prices.

CIRCLE INFORM-A-GRAM KEY NO. 995

Anything new in Diamond Wheels?

YOU BET . . . THE NEW BC

RESINOID BOND FOR SURFACE GRINDING

Soft, "J and L," hardness wheels are recommended by many manufacturers for surface grinding.

Now a new, special "N" hardness bond has been successfully developed. Users report 30% *longer life, greater efficiency,* smoother finish, and elimination of chatter marks.

Man-made diamonds give optimum performance. Ask for and try the following grade:

MD 120 N100 BC

SEND US SATISFACTION GUARANTEED ORDERS. MAKE US PROVE THESE FACTS.

PRECISION DIAMOND TOOL CO.
P.S.M.
ELGIN, ILLINOIS

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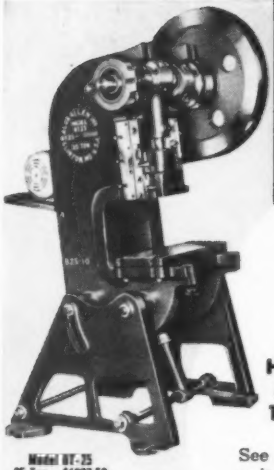
ALVA ALLEN
HEAVY DUTY PUNCH PRESSES

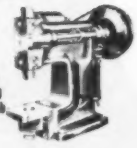
Powerful • Dependable
Economical
Fully Guaranteed
Moderate in Price

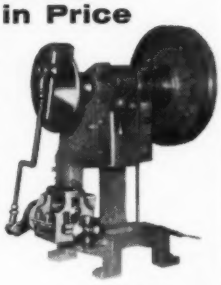
Hundreds of different Model Combinations 1 to 25 ton Capacities

See your Supply Dealer or write for catalog giving complete information, specifications and prices on our line of Heavy Duty Punch Presses.

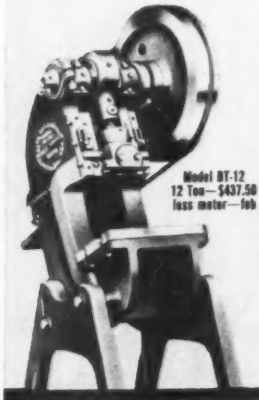
Thousands in Use the World Over


Model BT-25
25 Ton—$1097.50
less motor—fob


Model LTX
Special Duty
1 Ton—$80.50
less motor—fob

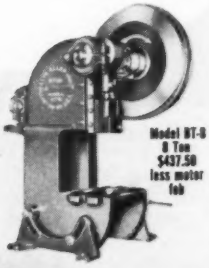

Friction Roll Feed
as low as—$145.00

Model B-2—2-Ton
Punch Press
$87.50
less motor—fob


Model BT-12
12 Ton—$437.50
less motor—fob

Dial Index Feed
as low as—$450.00

Model BT-5—5-Ton
Punch Press
$199.50
less motor—fob


Model BT-8
8 Ton
$437.50
less motor
fob

See the yellow pages of your telephone directory for local distributor.

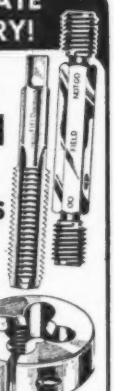
ALVA ALLEN INDUSTRIES, Dept. TP, Clinton, Missouri · Tel. TUrner 5-3331

CIRCLE INFORM-A-GRAM KEY NO. 1001

WHY WAIT? IMMEDIATE DELIVERY!

LARGEST STOCK OF
SPECIAL RH & LH Taps-Dies & Thread Plug Gages

Also in Stock:
- RING GAGES • ACME & METRIC TAPS & DIES
- SPECIAL REAMERS
- EX. LONG DRILLS



Write Today for WALL CHART Special Taps Also Made to Your Print Specifications

Quotations on Request

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Industrial Cutting Tools
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All Phones: Financial 6-1195

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Every Shop Should Own One

13.50

No distortion—
even on ⅛" stock!
MODEL "C"

KNURLMASTER Hand Knurler

For small production runs on ⅛" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened straight or diamond pattern knurls of standard ½" dia. Forged steel frame is self-centering. Write for illustrated folder.

ROCKWIN MANUFACTURING CO.

80A MAGNOLIA AVE., WESTBURY, L.I., N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1003

Product News

Bearing Washer

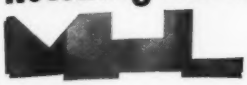
Only four universal tooling sets are needed for Model MC-4-1 to clean all ball and roller bearings from ¼ to 7" OD. It cleans by alternately forcing clean, pressurized solvent and air through the bearing. High solvent air flow up to 1½ gpm, and sharp air blasts remove lubricant and dirt in 30 sec. Standard model employs one micron filter. Finer filters can be supplied according to Bearing Inspection, Inc., Huntington Park, Calif. Circle No. P34.

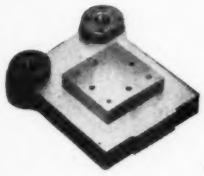
Tape Punch

A new model tape punch to be used with the Carlton numerical control system is designed to produce alpha-numerical coded tapes for data input. Model TP-1 uses standard eight channel code and punches for non-standard codes can be furnished on special order. Write Carlton Controls Corp., 15 Sagamore Rd., Worcester, Mass., or circle Inform-A-Gram No. P35.

Punches and Dies

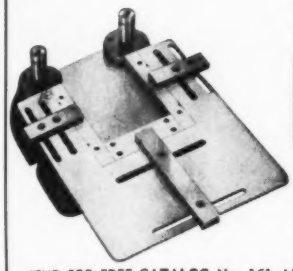
Notching Die with Gauge Table





Standard stock sizes 4", 5" and 6". Lick those Notching Problems QUICKLY. Gauge table and gauging bars provide accuracy and speed with easy adjustment.

This is another of the many different kinds of punches and dies in stock or made to order for foot, hand or power operation. Precision made from high grade tool steel. Also adaptors and die shoes to convert your press.



29 *years of serving your punch and die requirements.*

What are your punch and die needs? Consult us about your problems. Prompt service on "Specials" made to your order.

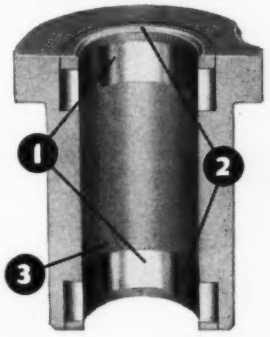
SEND FOR FREE CATALOG No. 161 AF, illustrating our standard punches and dies and complete line of modern sheet metal fabricating equipment. **Net prices shown.**

WARD Machinery Co. 564 West Washington **Chicago 6**

CIRCLE INFORM-A-GRAM KEY NO. 1011

A Cost Saving

BUSHING STORY IN A NUT SHELL



*PATENTED

1. Tungsten carbide rings at the points of wear; **2.** Steel rings protect drills and carbide; **3.** Special hardened alloy steel body; **4.** Performance: same as solid carbide, but need not be handled with kid gloves; **5.** Greatest economy, because of maximum life at minimum cost; **6.** Enjoy the advantages of greater accuracy for a longer time, less spoilage, less machine down-time, added drill and jig life with MEYCO carbide inserted drill jig bushings.

Write for New Bushing Catalog No. 41

MEYCO **W. F. MEYERS CO., Inc.**
BEDFORD, INDIANA
A famous name in precision tools since 1888

CIRCLE INFORM-A-GRAM KEY NO. 1012

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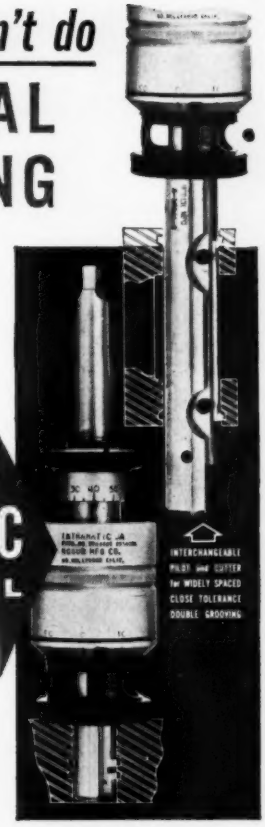
what you *couldn't do* in INTERNAL RECESSING yesterday... you *can do* today...

WITH THE NEW

INTRAMATIC TOOL



only the **INTRAMATIC** provides these revolutionary features in **AUTOMATIC** internal recessing...

1. Capability for wide face or multiple-form grooves.
2. Deep grooving capabilities.
3. No limitations on groove position, regardless of remoteness from entry face.
4. Back spotfacing to a maximum diameter of two times the hole diameter.
5. Pilots directly in the part for employment with any machine tool without special fixturing — or may be furnished to accommodate employment in conjunction with *existing* drill jigs, etc.
6. One basic Model "JA" will accommodate holes within the range of ¼" - 2" (with appropriate interchangeable pilots and cutters).

MODELS FOR LARGER AND SMALLER HOLE SIZES ALSO AVAILABLE

...with these proven results:

1. Positive, rigid cutter support — *no compressive or torsional deflection of cutter.*
2. Improved finish quality.
3. Greater dimensional reliability.
4. Higher production rates and longer tool life.
5. Simplified setup.
6. Quick interchangeability to various applications.
7. Low-cost flat-form cutters for most applications.

CUTTING PRINCIPLE

INTRAMATIC

Flat-form cutter is channelled and cammed from directly within the pilot. Cutting forces are constrained and balanced without compression or torsional deflection of cutter.

CONVENTIONAL ECCENTRIC TYPE TOOL

Extended and unsupported cutter is subject to deflection under cutting load. Many-fold disadvantages are evident.

Deflection of cutter from true axis.

Let us quote to your requirements involving grooves for snap rings, "O" rings, thread reliefs, undercuts, back spotfacing, etc. Submit parts print marked to show tool entry and manufacturing outline showing all applicable dimensions at time of grooving.

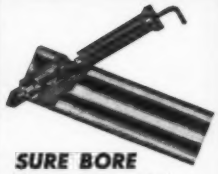
NOBUR MANUFACTURING CO.
6660 Farmdale Ave. North Hollywood, California

CIRCLE INFORM-A-GRAM KEY NO. 1013

P.D.Q. TOOLS PACE INDUSTRY...

★ **LAYOUT MACHINE**
Save up to 80% on layout time. Lays out all four sides, top, bottom and inside in one set up.

★ **QUICK CHANGE TOOLS**
Holders and adapters for every machine use.



★ **SURE BORE**
Micrometer adjusted —Carbide Tool Bits, Boring Bars and Heads

★ **END MILL DRIVERS**
Cuts Keyways to size with UNDERSIZE end mills

★ **CARBIDE CUT-OFF TOOLS**
Available for all automatics, turrets and cut-off machines

★ **GROOVE CHECKING GAUGE**
⅜" to 6" Dia. range in one unit . . . quick setting

★ **MILLING CUTTERS**
Carbide inserts—can handle the toughest jobs.

Literature is available on all tools illustrated

PORTAGE Double-Quick TOOL CO.
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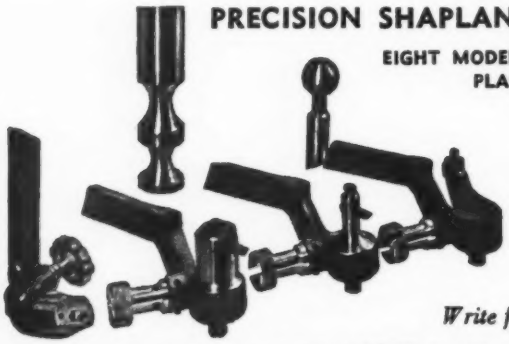
CIRCLE INFORM-A-GRAM KEY NO. 1021

PRECISION SHAPLANE RADIUS TOOLS

EIGHT MODELS FOR LATHES, SHAPERS, PLANERS AND BORING MILLS



Range: 3/32" to 3" for concave radii on lathes. Two sizes for convex radii (Balls up to 2½" dia.) on lathes. Also heavy duty model for radii to 6" on planers, etc.

Write for circular

Patent Pending

C. B. TEETER - Tool Room Specialties

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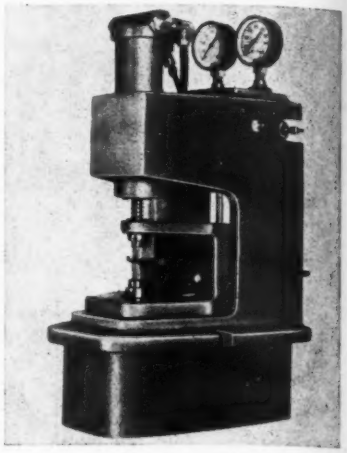
CIRCLE INFORM-A-GRAM KEY NO. 1022

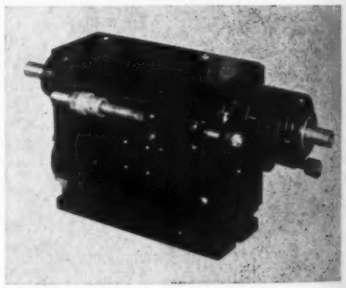
Product News

Double-Acting Presstaker



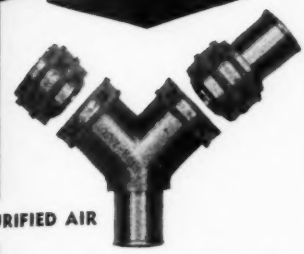
A new fully automatic assembly tool combines the press-stake-eject cycles in one operation. Independent pressing and staking forces adjust from lightest tap to one ton. An automatic, adjustable ejector removes finished assemblies. The removeable "C-Holder" die set adapts to a wide range of assembly operation, and the lower part of the machine fits into a work bench for ideal working height. Presstaker Model 010B-CA bulletin from Cramer Controls Corp., Centerbrook, Conn. is yours for the asking, or mark Inform-A-Gram No. P36.

Automatic Drilling Unit



A new automatic drilling unit, capable of drilling holes up to ½" dia in cast iron, develops a thrust three times the air pressure supplied. Air power thrust and the hydraulic counter-thrust are applied along the centerline of the quill, eliminating deflection and increasing accuracy. Information about Model 300 from Govro-Nelson Co., 1931 Antoinette, Detroit 8, Mich., or circle No. P37.

DISCONNECTS
Exploring new Horizons



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Full line flow into "Y" socket. Metering orifices in socket permits supplying required air for one to six outlets.

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Double shut-off type with modified bayonet locking. Metal to metal seals operating against 75 PSI, minus 310°F. Meets A. F. specs.

MINIATURE COUPLING

Weighing only 1/4 oz. with 7/16" OD and 1-1/8" OAL, this aluminum coupling designed for 1/8" tubing connections to missile motor. Easy Pulomatic ball detent locking action.

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Connects oxygen and communications wiring to pressurized flying suits, survival kits and capsules. Seal engages and disengages before electrical contacts.

FUEL CHARGING

Straight-thru type with fast Pulomatic ball detent locking. Unique design permits high pressures, light weight construction and flush mounting.

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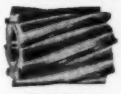
Now standard in these types!

Shell mills

End Mills and Adapter

Staggered-tooth Side Mills

Interlocking Side or Straddle Mills



Slab mills

Write for catalog and name of your nearest distributor.

Special tools designed with "Helicarb" principle.

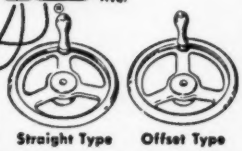
SONNET
TOOL AND MANUFACTURING COMPANY
571 North Prairie Avenue, Hawthorne, California

The original line of standard Helical Carbide tools

CIRCLE INFORM-A-GRAM KEY NO. 1032

Tomco INC.

HAND WHEELS



Straight Type Offset Type

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- HAND KNOBS
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- HANDLES
- BALL HANDLES
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- SPECIALTIES

GRADUATED DIALS

SPECIFY TOMCO FOR DEPENDABILITY

A Complete line of high grade hand knobs, levers, handles, hand wheels, graduated dials is available for immediate shipment from stock of standard items. Specialty items made to your specifications.

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Tomco INC.
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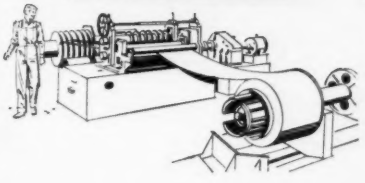
YODER Rotary Slitting Lines ... produce the strip widths you need!



Investigate the many advantages of YODER-engineered Slitter Installations. Write today for the comprehensive, 80 page YODER Slitter Manual ... it's yours for the asking!

THE YODER COMPANY
5501 Walworth Avenue • Cleveland, Ohio

1910 **FIFTY YEARS** 1960

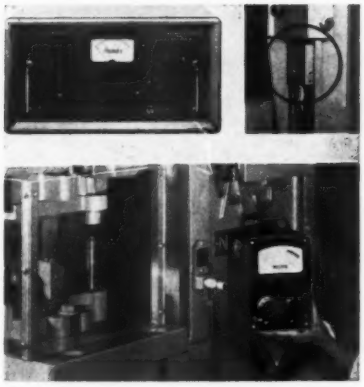
ENGINEERING **YODER** MANUFACTURING **ROTARY SLITTING LINES**

CIRCLE INFORM-A-GRAM KEY NO. 1034

Product News

Press Load Monitors

Two new measuring devices have been introduced by Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y. Continuous measurement of all press loads on a given press is the forte of the Niagara Load Monitor Model 112. It registers loads from 0 to 140% of press capacity and is equipped with a special tripping device to prevent overload repeats. Inform-A-Gram No. P38. The Niagara Tonmeter, Model 119, is the load monitor's portable counterpart. Compact and mobile, it is designed to show maximum load on a press during operating cycle.



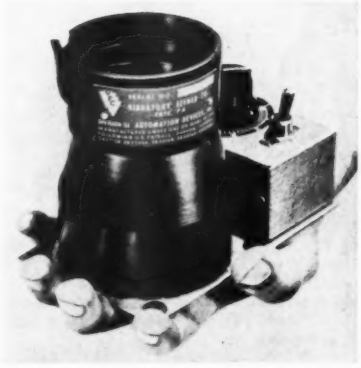
Like the monitor it responds instantly and accurately regardless of press speed. Setting the simple press factor dial calibrates the meter for each press. Circle Inform-A-Gram No. P39.

Air Metal Cutting Shears

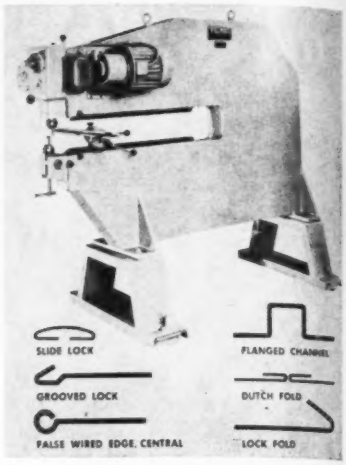
A novel 12 gage, air metal cutting shear has made its appearance. The tool has an air trigger throttle to control or vary speed. It has automatic start-stop lubrication from an oil reservoir in the handle, and cuts up to 12 fpm. Stanley Works, 195 Lake St., New Britain, Conn. points out the unit's low maintenance due to fewer and more durable parts and a 100% duty cycle under heavy duty operation. For complete specifications and literature, write the maker or check No. P40.

Compact Vibratory Feeder

Engineered for automatically orienting and feeding minute parts for machining or assembly operations, this tiny unit can be held in one hand. Base unit and 3" molded bowl is complete with rheostat variation control, control switch and 5' power cord, all mounted in one single unit. Developed specifically for optical and electronic industries, the feeder has wide applications in other fields. More data from the manufacturer Automation Devices, Inc., Erie, Pa., or No. P41.

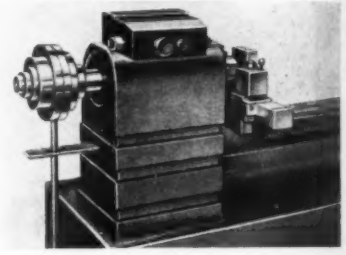


Lock Forming Tools



Lock folds, grooved locks, flanged channels, slidelocks, dutch folds, and false wired edges can now be formed with the Pullmax machine. These six new tools for all standard locking operations are added to the 12 standard cutting operations now possible with the Pullmax unit. More information from American Pullmax Co., Inc., 2455 N. Sheffield Ave., Chicago 14, Ill. Inform-A-Gram No. P42.

Collet Actuator



Model 26A Power Grip actuator is designed to actuate the Power Grip precision chuck, drawback collets, step chucks, expanding arbors and collets, or any holding device requiring a pull-back action to operate it. The unit, with single-acting air cylinder and spring return, is used on small high speed lathes, precision boring machines, grinders, speed lathes, hand screw machines, and gear cutters. Equipped with cylinder adapter and draw tube to fit requirements of the machine on which it will operate. Bulletin 31060 will be supplied by Power Grip, Inc., Rockfall, Conn., or mark Inform-A-Gram No. P43.

Drill Hardened Steels without Annealing—

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon—high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It—
With "HARDSTEEL"

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1368 East 22nd St. • Cleveland 17, Ohio

"HARDSTEEL"

CIRCLE INFORM-A-GRAM KEY NO. 1051

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DEEP THROAT ENGRAVER

DOES PRECISE, 2-DIMENSIONAL WORK . . . CAN HANDLE OVERSIZE WORKPIECES . . .

This excellent engraver handles workpieces up to 10" tall, 38" wide; on a work table 20x8"; auxiliary table 18x24" can be attached if necessary. Ratios from 1:1 to 50:1; spindle has fine and coarse feed adjustments; cutters up to 1/4" dia.; speeds from 2800 to 15,000 rpm; 1/4 h.p.; net wght. approx. 600 lbs.

Prompt delivery.

We have other engravers, and die-sinkers as well. Spindles, cutters, attachments, cutter grinders, and spare parts are stocked in Caldwell. Write for catalog B.

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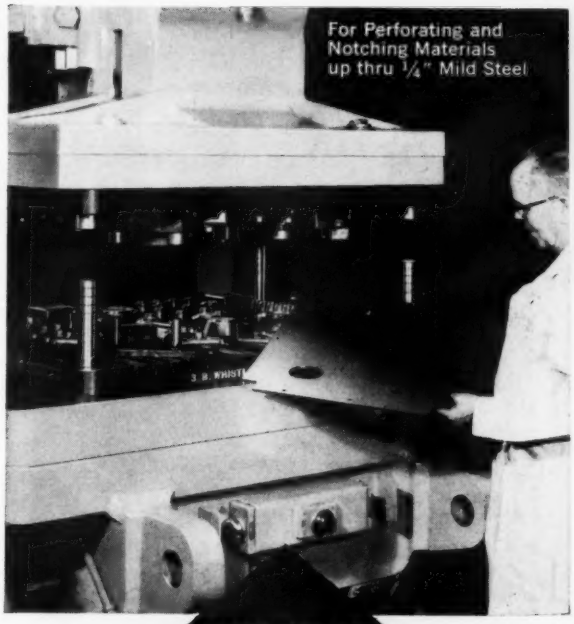
CIRCLE INFORM-A-GRAM KEY NO. 1052



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save thousands $$$ in tooling costs

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- Even new workers can quickly learn to make pattern changes.
- Tooling costs cut to rock bottom.
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- Punches and dies stocked in .001" increments from .100" to .500" diameters. Larger sizes in stock up to 3".

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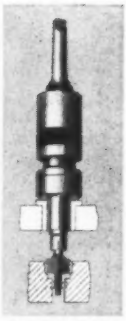
CIRCLE INFORM-A-GRAM KEY NO. 1053

QUICK-CHANGE FEATURE ENABLES BOKUMATIC RECESS TOOL HOLDERS TO WORK OFF FIXTURE... OFF PART

- Only recess tool holder available with quick-change adapter.
- Holder convertible to off-center style for deeper recessing by changing to off-center type adapters.
- Holder uses straight shank cutting tools, reducing cost of perishable tools.
- Holder can be used either vertically or horizontally.
- Holder convertible from jig fixture piloting to work piece piloting.
- Holder actuated by two cam pins 180° apart for smooth chatter-free recessing.
- Cam pins accessible for easy replacement.
- Replaceable tool holder shanks are located by two pilots for positive concentricity.
- Bokum standard recessing cutters with radial relief can be used.
- Cutting tool can be preset in quick-change adapter as to depth into part before tool holder is assembled.

Write today for catalog BO-1-60



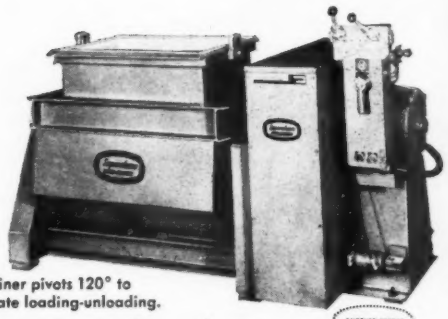
Standard Model B holder with quick change adapter and pilot to fit in bushing plate assembly.

Standard Model B-1 holder and quick change adapter and pilot to work off part.

BOKUM TOOL COMPANY, INC.

14775 WILDEMERE AVENUE
DETROIT 38, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1061



Container pivots 120° to facilitate loading-unloading.

ALMCO *Vibrasheen* FINISHES FASTER!

Constant vibratory motion... that's the secret of faster deburring and finishing you now get by using the new ALMCO *Vibrasheen* Method!

This amazing metal finishing machine vibrates a full 5 cu. ft. load* of parts and media . . . uses scrubbing action to remove burrs and finish parts in a fraction of the time required in ordinary barrel finishing operations.

The new *Vibrasheen* Method is particularly suited for faster burr removal from parts, and finishing hard-to-reach internal crevices. Can be used for deburring, descaling, cleaning, burnishing and surface refinement.

For full story on *Vibrasheen* Method and on processing sample parts, write for the new ALMCO Album of New Products!

** Smaller and larger models also available.*

FREE!
NEW PRODUCT ALBUM
Gives full information on new Almco Supersheen Systems. Describes new and better machines, methods and media. Write today!

ALMCO
QUEEN PRODUCTS DIVISION
King-Seeley Corporation
142 E. Main St.
Albert Lea, Minnesota

CIRCLE INFORM-A-GRAM KEY NO. 1063

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MADE TO ORDER
CUTTING TOOL REQUIREMENTS
We solicit your SPECIAL REAMER and SHANK Type cutting tools. Quotations promptly given to your blueprint, sketch or other types of specifications. Write for catalog.
World Greatest Selection of Reamer Sizes
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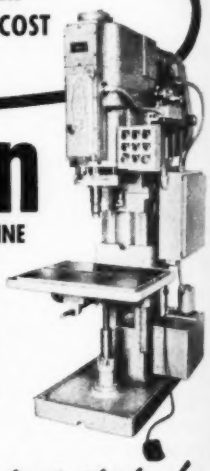
Phone: Libertyville 2-4200
TWENTIETH CENTURY MANUFACTURING CO.
Route 176 and Bradley Road
Box 429 TP Libertyville, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1062

on any tapping job . . .
MORE PRODUCTION PER HOUR means LOWER COST for YOU with a

kaufman

MODEL 10E-20 TAPPING MACHINE



More and more manufacturers are learning this fact from hour after hour, day after day, precision production tapping on the Kaufman 10E-20. With higher production, lower product cost, increased sales in mind — you, too, should learn all about the Kaufman 10E-20.

Get the complete facts today!

Write, wire or phone for complete information on the precision tapping machine — the Kaufman 10E-20.

kaufman MFG. CO.
PRECISION MACHINES FOR TOP PRODUCTION
529 S. 29th St., Manitowoc, Wisconsin

CIRCLE INFORM-A-GRAM KEY NO. 1064

Product News

Drill Press Work Table

A fourth work table for their 18 x 24" geared head drill presses completely interchangeable with the other tables, has been added by Boice-Crane Co., 963 West Central Ave., Toledo 6, Ohio.

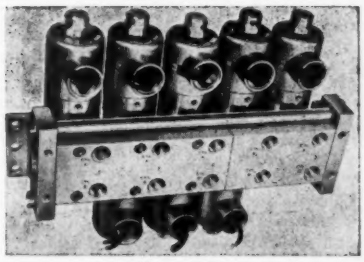
Over-all size of the newcomer is 25 x 20" outside a deep coolant trough which completely surrounds the 22¼ x 17¼" finished work surface. The company furnishes additional information, or check Inform-A-Gram No. P44.

Reciprocating Saw

Straight, curved, and circular cuts can be made in practically any material (including metal plate angle iron pipe, conduits and plastics) with the new Millers Falls Super Saw. This easy-to-handle tool cuts its own starting hole in wood. The blade is set at an offset angle for quicker chip removal, faster cutting and longer blade life. Lightweight aluminum housing, locking trigger switch, ball-bearing construction, and easy-grip tapered nosepiece are other features. Write Millers Falls Co., Greenfield, Mass., or check Inform-A-Gram No. P45.

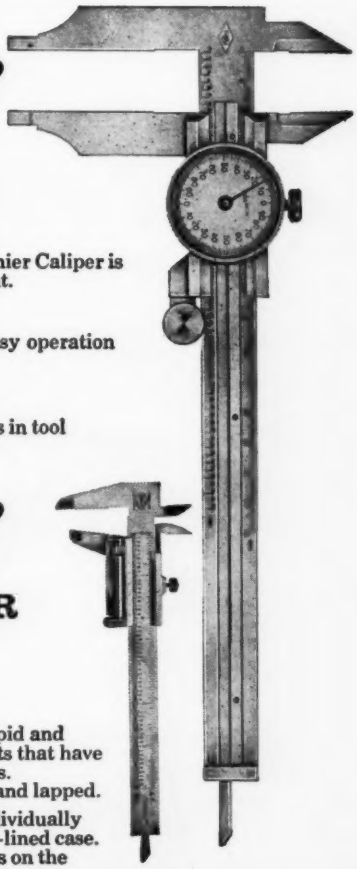
Multiple Subplates

Many valves can function as one unit with new "Co-Ordinate" multiple subplates. Produced by Versa Products, Co., Inc., 150 Coolidge Ave., Englewood, N.J., Co-Ordinates allow manifold mounting of Versa series "A" solenoid valves in one location via unit-by-unit expansion. Two and three place mountings are the basic, and a screw driver and Allen wrench are the only assembling tools needed. Aside from space saving advantages, each Versa four-way solenoid with a full 3/16" dia flow passage makes it the largest capacity valve for its size. Write the maker, or check No. P46.



Eliminate costly reading errors with the

"HELIOS"
DIAL VERNIER CALIPER with built-in DIAL INDICATOR
Direct Reading in .001"



The world famous "HELIOS" Dial Vernier Caliper is hardened, ground and lapped throughout.

Other features:

- Thumb roll permits quick and easy operation
- Knurled lock screw
- 100% measuring capacity (outside, inside and depth.)

Available in 5", 6", 8" and 10" capacities in tool steel or stainless steel.

Height Gage Attachment optional.

"HELIOS"
SWING-JAW VERNIER CALIPER
with knurled lock screw

- Direct Reading
- Capacity 4¾"
- Length of Jaw 1⅝"

The swinging jaw allows a very easy, rapid and extremely accurate measurement of parts that have faces which do not lie along the same axis. This caliper is stainless steel, hardened and lapped.

Every "HELIOS" Vernier Caliper is individually packaged in a beautiful hardwood velvet-lined case. Write for detailed information and prices on the "HELIOS" Caliper line.

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M. B. I. EXPORT & IMPORT LTD.
A DIVISION OF MACHINERY BUILDERS, INC.
475 Grand Concourse, Bronx 51, N. Y.
"Over 25 years' experience in designing and building machinery."

CIRCLE INFORM-A-GRAM KEY NO. 107

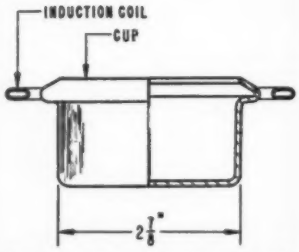
LepeL

HIGH FREQUENCY *Induction* HEATING UNITS

Lepel induction heating equipment is the most practical and efficient source of heat developed for numerous industrial applications

Typical Induction Heating Applications

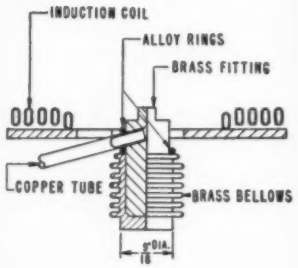
Stainless Steel Cups Selectively Annealed



Flanges of cups made from type 321 stainless steel are selectively annealed by induction heating prior to further forming. Flanges are heated to 2000° F and water quenched. Single-turn coil restricts heating to the flange area.

Our engineers will process your work samples and return the completed job with full data and recommendations without cost or obligation.

Bellows Assembly Brazed



Brass bellows and copper tube are simultaneously silver-alloy brazed to a brass fitting by induction heating. Plate-type induction coil produces proper temperature at each joint.

WRITE FOR NEW LEPEL CATALOG

LepeL HIGH FREQUENCY LABORATORIES, INC.

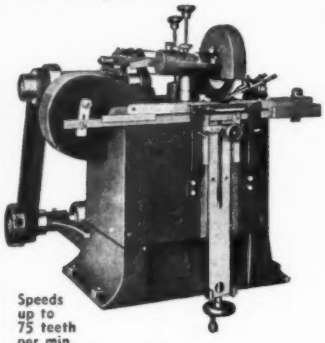
55th ST. & 37th AVE., WOODSIDE 77, N. Y.
CHICAGO OFFICE: 6246 WEST NORTH AVE.

CIRCLE INFORM-A-GRAM KEY NO. 1081

SAVED SAWS SAVE

Money you can put in your pocket!

Sharpening a gross of hack saws just 6 times will return the price of this Model EC Combination HACK, BAND and CIRCULAR Saw Sharpener.



Speeds up to 75 teeth per min.
As fine as 32 per inch.

Also Mfgrs of
FLUTE MILLERS & GRINDERS
Write for Complete Details.

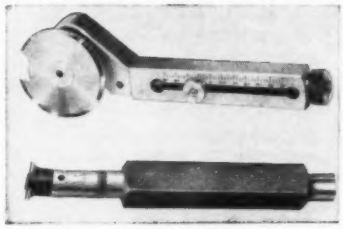
WARDWELL
MANUFACTURING CO.
3809 Ridge Road, Cleveland 9, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 1082

Patented MP TOOL

CUTS THREADS 40% FASTER!

Graduated scale for angular setting



PERFECT PROFILES: ENDS TORN THREADS

Cut costs sharply with MP tools for internal or external use. Thread is engaged depthwise by circular cutting disc (high speed or carbide) which has negative profile and adjustable angle. Machines both thread flanks simultaneously. Shavings released separately, can't disturb thread formation. MP pays for itself in savings. Swiss made with Swiss precision. Stock carried in U.S.

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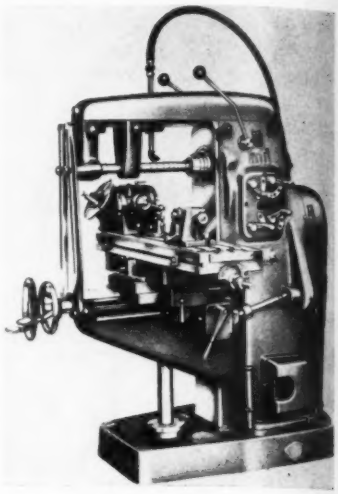
P. O. Box 1165 Coral Gables 34, Fla.

CIRCLE INFORM-A-GRAM KEY NO. 1083

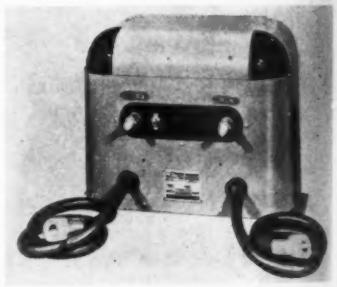
Product News

Milling Machine

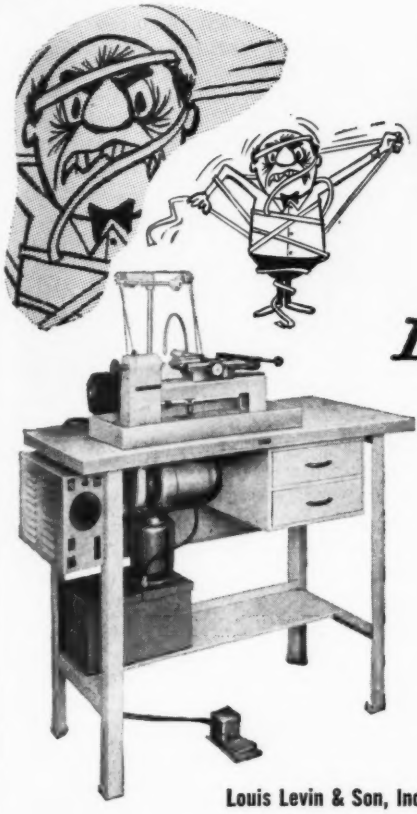


Model VPU-1 Pederson milling machine is now available with power rapid traverse. Other special features include an extra large size table, a universal dividing head, a rack milling attachment, rack vise, and a circular milling attachment. For further information contact Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N.Y., distributors of Pederson milling machines and tool and cutter grinders; or circle No. P47.

Arc Starter and Stabilizer



A new high frequency automatic arc starter and stabilizer for use with any AC or DC welder will eliminate false starts, even with low open-circuit voltage, and stabilize the arc on low-current settings. Model HF 60 operates from a 230-volt AC source and is rated at 600 amp capacity. Other primary voltages are available. Model HF 60R features remote control. Write Metal & Thermit Corp., Rahway, N.J., or circle No. P48.



ARE YOU PROPERLY GEARED FOR

MINIATURIZATION?

DRILL MICRO-HOLES

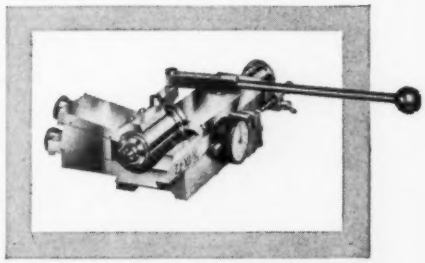
DOWN TO .0016"* with SPEED & ACCURACY

LEVIN ® MICRO-DRILLING MACHINE

Designed for the most precise drilling of small holes. The drilling spindle, as well as the head stock spindle, revolves and thus the maximum straightness and concentricity are assured. The feed is so arranged that it does not depend on the operator's sense of feel and the smallest drills may be safely used.

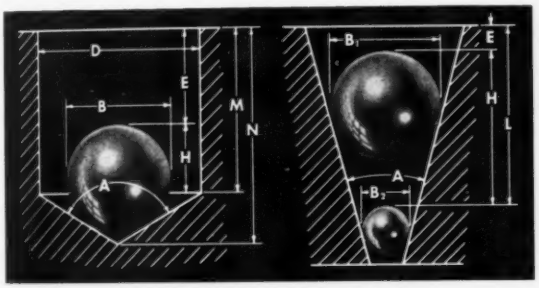
* Smallest commercial drill available.

For full details of Drilling Machine and Instrument Lathes send for catalog T.



Louis Levin & Son, Inc., 3573 Hayden Ave., Culver City, Calif.

CIRCLE INFORM-A-GRAM KEY NO. 1091



Tungsten Carbide

MASTER BALLS

- **For simplified checking** of hole depth, ID's, internal tapers — setting comparator gages — many other uses in shop, tool room and gage room.
- **Accurate to .000,010"** on size and sphericity.
- **Extremely hard** and wear-resistant. *Do not pit or rust* from handling or humidity.
- **Available from stock** in sets or individually in 31 sizes — 1/16" to 1" by 1/32" increments.

BULLETIN P-41 gives specs and prices. BULLETIN B-41 gives hole-checking methods and formulas. Write for them!

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ANN ARBOR 4, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1092

LASSY TAPPERS . . .

Lassy Tappers make tapping easy, fast and simple. Exclusive patented features eliminate guess work, drastically reduce labor costs, save taps.

3 SIZES.

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UNCONDITIONALLY GUARANTEED

LASSY TOOL CO.

PLAINVILLE, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 1093

SOLID CARBIDE CUT-OFF TOOLS

IN STOCK

Gashed, ready for use, in several widths for #00, 0 & 2 B&S machines. Same tool will cut either right or left hand. *Solid carbide cutting edge brazed to threaded steel center hub to eliminate breakage.

Get all the advantages of carbide:

Longer wear **Less Galling**

Better finish **Higher speeds**

Plus: up to 10 times the tool life of carbide tipped tools. Somma solid carbide cut off tools combine reasonable cost with long run savings by off the shelf delivery. Write for prices and name of your representative.

Somma TOOL CO., INC. 114 Scott Rd., Waterbury, Conn.

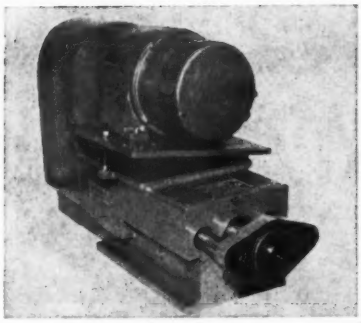
West Coast Warehouse: 576 N. Prarie, Hawthorne, Cal.

CIRCLE INFORM-A-GRAM KEY NO. 1094

Product News

Precision Tapping Unit

A heavy duty tapping unit only 32" long, 10-1/16" wide and 22½" high has been announced by Johnson Drill Head Co., Rockford, Ill. With 6" maximum spindle travel, it's ideal for multiple station arrangements on fixed and indexing tables. Each unit has its own control panel and can make 30 reversals/min. Write the maker, or check Inform-A-Gram No. P49.

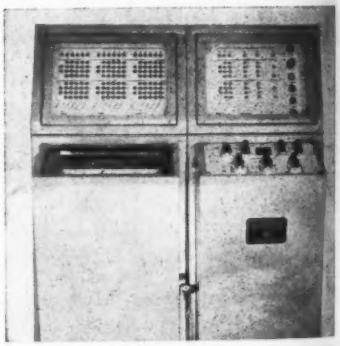


Midget Clamping Tool

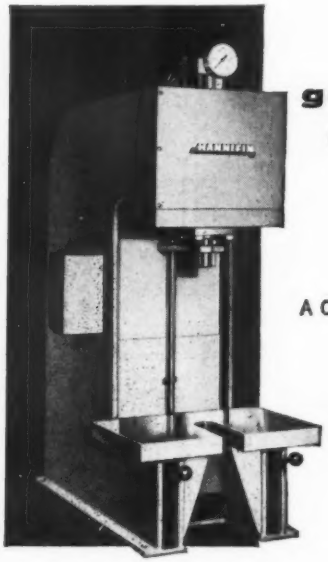
Clamping of electric and electronic parts, control mechanisms, and aircraft missile parts, will be simplified with Midget PowRlock. The new power lock clamping line includes two sizes of hydraulic heads with ½ and 1" stroke. PowRlock will develop a piston thrust varying from 1,050 to 1,900 lbs with air line pressure of 100 lbs psi, depending on booster used. Wilton Tool Mfg. Co., Inc., 9525 Irving Park Rd., Schiller Park, Ill., will supply additional data, or circle No. P50.

Numerical Control Systems

An all-transistor numerical control system was designed to effect cost savings over conventional machining methods. Thompson Ramo Wooldridge, Dage Div., Michigan City, Ind., states that one of the applications to which these Director Control Systems have been applied is on continuous path control



of a Sundstrand Model 21 vertical single spindle three-axis rail type machining unit. Numerically, controlled contouring milling machines will reduce leadtime, tooling cost and manufacturing costs of complex parts. Write direct to manufacturer, or check Inform-A-Gram No. P51.



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A COMPLETELY NEW LINE OF HIGH-SPEED HYDRAULIC BENCH PRESSES

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2, 3, 4, 5, 6, 8, 10, 12, 15, 20 and 25 TONS

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Our quantity production gives you highest quality at lowest cost.

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Dual Safety Hand Lever Controls	Assembly Operations
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Adjustable Stroke Control	Forming – Stamping
Reverse on Pressure or Distance	Trimming Die Castings
Full Automatic Cycling	Trimming Plastics
Hannifin High Speed Hydraulic Index Tables	Molding Semi-Conductors
Reciprocating Hydraulic Slide Feeds	Preforming – Compacting

MAY BE FLOOR MOUNTED—OPTIONAL, LOW-COST BASES AVAILABLE

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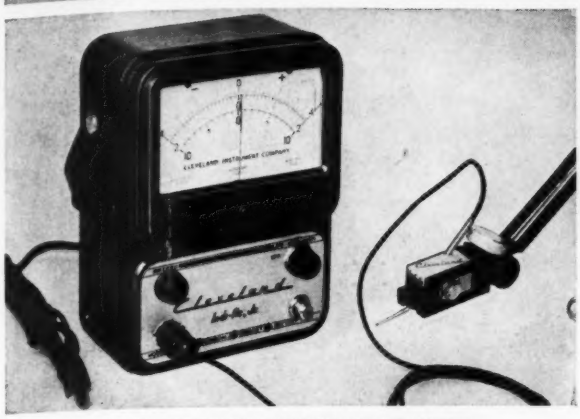

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ROUGHNESS METER—For surface finish measurement

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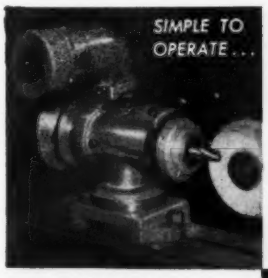
SAVE AND IMPROVE!

TWIN FIXTURES TO SHARPEN VIRTUALLY EVERY TYPE OF TOOL IN YOUR PLANT!



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RELIEF-GRINDING FIXTURE
• CAM-RELIEF GRINDER
• DRILL POINTER

Versatile, dual-purpose grinder for an endless variety of tools. Fits any tool and cutter, or surface grinder. FAST: step a ⅜" drill in 5 min. . . . sharpen tap in 20 sec. . . . grind *HELIXPOINT* in 3 sec.

ENORMOUS RANGE: 1/64" thru 1 1/32"

HARIG
AIR-FLO FIXTURE
END-MILL & MILLING CUTTER SHARPENER

Spindle "floats on a cushion of air"! . . . super sensitive, ultra precise, jerk-free, easy to use! *Speeds* and improves sharpening of end-mills and all types of milling cutters . . . small tools 1/32" up to 1¼" shank capacity.

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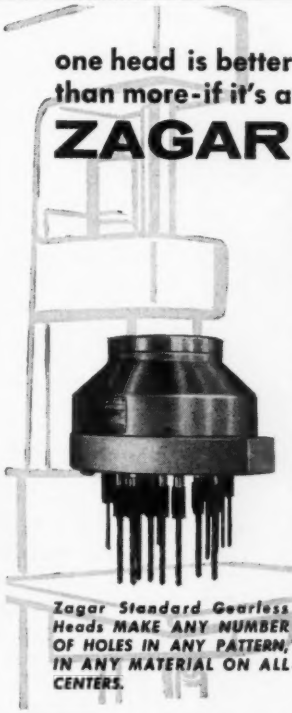
Harig Manufacturing Corp.
5761 HOWARD STREET • CHICAGO 48, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1112

one head is better than more-if it's a
ZAGAR Head for Drilling, Reaming and Tapping



1 to 1000 holes in one pass —as close as twice drill diameter. Costs decrease as spindles are added. *And,* a variety of hole patterns (or parts) can be produced with *one fixed center head.* Zagar units are adaptable to standard drill presses or are built as a complete installation. Send in your hole problem to Zagar.

Zagar Standard Gearless Heads MAKE ANY NUMBER OF HOLES IN ANY PATTERN, IN ANY MATERIAL ON ALL CENTERS.

Write for Manual "T-2" for engineering data.

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23894 LAKELAND BLVD. • CLEVELAND 23, OHIO
USE MORE SPINDLES TO DO MORE WORK

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for HARDENING • BRAZING
SOLDERING • FORGING • ANNEALING
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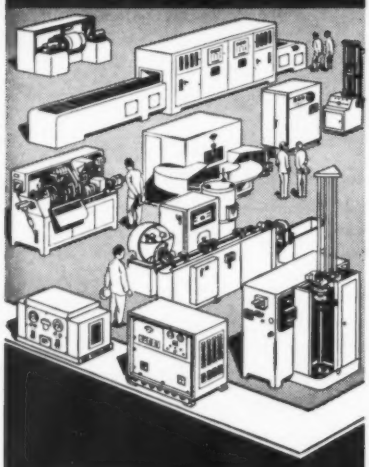
CRYSTAL GROWING



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MOTOR GENERATOR

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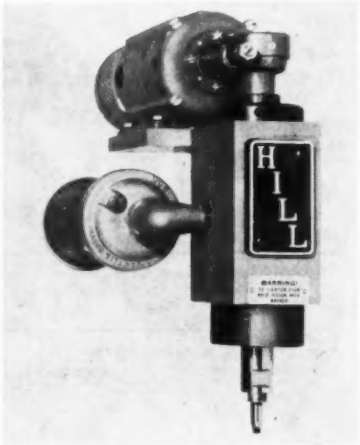
Subsidiary of HATHAWAY INSTRUMENTS, INC.
CIRCLE INFORM-A-GRAM KEY NO. 1121

Product News

Semco Press Brake

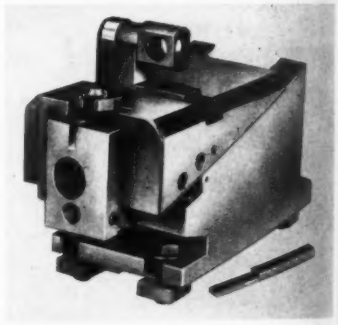
A new Semco press brake boasts many features usually found only in larger presses. There are ball bearings throughout, and the one-piece eccentric shaft and the ram adjusting screws are made of alloy treated steel. The eccentric shaft features an alloy bronze bearing. Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N.Y., will furnish additional data, or circle Inform-A-Gram No. P52.

Separate Riveter Head



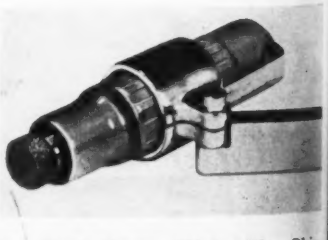
The Hill peening-type riveter head is now available as a separate unit. Easily mounted vertically, horizontally on a column, pedestal, or panel, it can also be made part of a special-purpose machine tool assembly. Several heads can be combined on one machine in various arrangements, and operated separately or simultaneously. This head is the same as used on Hill spinner riveters according to Hill Machine Co., Rockford, Ill. Check Inform-A-Gram No. P53.

Dual Recess Tool Holder



A heavy-duty recess tool holder is able to cut an internal and external groove on the end of a part. Available for multi-spindle bar and chucking machines, the holder mounts on the main tool slide and is actuated by a draw bar. A single reversible tool setting gage is furnished with the holder. Write Screw Machine Tool Co., 17565 Swift Ave., Detroit 3, Mich., or check Inform-A-Gram No. P54.

Swivel-Arm Toolholder



A new swivel-arm toolholder permits quick and easy mounting of air tools on any lathe, providing numerous work positions. Made of chrome plated high alloy steel, the holder is available in two sizes for series 1 and 2 Dotco tools. This holder enables use of high speed Dotco air grinders and sanders directly on the lathe. Write Doeden Tool Corp., Hicksville, Ohio, or check No. P55.

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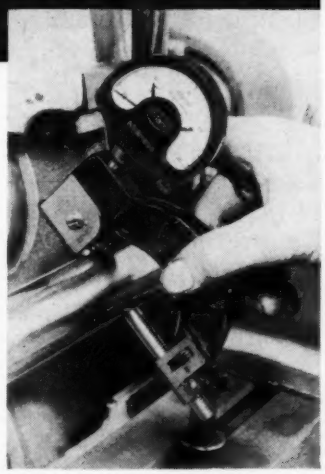

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Alina Corporation 73
Alva Allen Industries 100
Almco, Queen Products Div., King-Seeley Corp. 106
American Drill Bushing Co. 116
Anchor Chemical Co. 95
Armstrong-Blum Mfg. Co. 96
Armstrong Brothers Tool Co. 97

Cyril Bath Company 23
Bausch & Lomb Inc. 8
Bay State Tap & Die Co. 33
Bellows Valvair Div., IBEC 19
Benco Collet Mfg. Co. 3
Besly-Welles Corp. 61
Black Drill Company 105
Boice Crane Co. 73
Bokum Tool Co. 106
Branch Manufacturing Co. 85
Brush Instruments Div., Clevite Corp. 115
Buckeye Tools Corp. 35
Buck Tool Company 72
H. L. Bushman Co., Inc. 94

Charmilles Engineering Works 77
Robert H. Clark Co. 99
Clearing Machine Corporation Div. of U. S. Industries, Inc. 55
Cleveland Instrument Co. 111
Cleveland Twist Drill Company 32
Comtor Company 97
Contract Services Directory 74
Cook's Lead Hammer Service 95
Cratex Mfg. Co. 75
Cullen Mfg. Co. 94

Dayton Rogers Mfg. Co. 93
J. Arthur Deakin, Inc. 105
Dechert Dynamics Corp. 91
Detroit Stamping Company 12
Detroit Testing Machine Co. 78
DeVlieg Microbore Div. DeVlieg Machine Co. 63
Dexco Corp., Raymac Div. 93
DoAll Company 17
Dumore Company 27
Dykem Company 96

Eclipse Counterbore Co. 74
Eisler Engineering Co. 94
Eldorado Tool & Mfg. Corp. 87
Electro-Mechano Co. 97
Eonic, Inc. 113
Erickson Tool Company 22

Federal Products Corp. 6
Ferguson Machine Corp., Sub. of Universal Match Corp. 83
Field Tool Supply Co. 100
Fortune Industries 67

Gas Appliance Service, Inc. 85
General Tool Division, General Fire Extinguisher Corp. 98
Gisholt Machine Co. 13

• H-P-M Div., Koehring Co. 7

Hamilton Tool Company 29
Hannifin Company Div., Parker-Hannifin Corp. 110
Hardinge Brothers, Inc. 57
Harig Manufacturing Corp. 111
Heimann Mfg. Co. 95
Heinrich Tools, Inc. 93
Horspool & Romine Mfg. Co. 73
Huebner Publications, Inc. 18, 67, 85, 113
Huron Machine Products, Inc. 87
Wm. J. Hutchinson Co. 69

Induction Heating Corp. 112
Industrial Tectonics, Inc. 109

Jergens Tool Specialty Co. 93
Johnson Mfg. Corp. 90

Kaufman Manufacturing Co. 106

Lassy Tool Co. 109
Lempco Industrial, Inc. 21
Lepel High Frequency Labs. 108
Louis Levin & Son, Inc. 109
F. J. Littell Machine Co. 16
Logan Engineering Co. 70

Machinery Builders, Inc. 107
Mahr Gage Co. 113
Mead Specialties Company 71
Metal Carbides Corp. 26
Metallurgical Products Dept., General Electric Co. 36
W. F. Meyers Co., Inc. 101
Minster Machine Co. 15
Mohawk File & Tool Co. 95
Moore Special Tool Co. 9

Karl A. Neise 74
Newcomer Products, Inc. 68
Nobur Manufacturing Co. 101

Oberg Mfg. Co. 79
O'Neil-Irwin Mfg. Co. 10
Optical Gaging Products, Inc. 38
Ortman-Miller Machine Co. 31

Parker-Hannifin Corp. 110
Parker Kalon Div. General American Transp. Corp. 20
Perfecting Service Co. 103
Portage Double Quick, Inc. 102
Porter Precision Products 99
Prebco Bushing Co. 94
Precision Diamond Tool Co. 99
Producto Machine Co. 96
Ring Punch & Die Div. 89

Reid Tool Supply Co. 78
Ren Plastics, Inc. 81
Richard Bros. Punch Div., Allied Products Corp. 25
J. A. Richards Co. 87
Rockwin Mfg. Co. 100
Rotor Tool Company 81

Sales Service Mfg. Co. 94
Sandvik Steel, Inc. Coromant Division 59
Seibert & Sons, Inc. 78
Sentry Company 95
Service Machine Co. 98
Shore Instrument & Mfg. Co. 74
Somma Tool Co. 109
Sonnet Tool & Mfg. Co. 103
Wm. Sopko & Sons Co. 97
R. L. Spellman Co. 95
Standard Tool & Mfg. Co. 14
P. A. Sturtevant Co. 78
Superior Die Set Corp. 66
Syntron Company 88

C. B. Teeter 102
Titan Tool Supply Co. 99
Tomco, Inc. 103
Trico Fuse Mfg. Co. 73
Twentieth Century Mfg. Co. 106

United States Diamond Wheel Co. 4
United States Drill Head Co. 80
U. S. Industries, Inc. Clearing Machine Corp., Div. 55
U. S. Metallurgical Labs. 67
Universal Engineering Co. 11, 30

Vascoloy-Ramet Corp. 5
Visi-Trol Engineering Co. 67
Vlier Engineering Corp. 34

Walton Company 113
Ward Machinery Co. 101
Wardwell Mfg. Co. 108
Warner & Swasey Company 2
Watts Brothers Tool Wks. 99
Wheatley Economy Die Set, Inc. 24
S. B. Whistler & Sons, Inc. 105
Wollensak Optical Co. 76

Yoder Company 103

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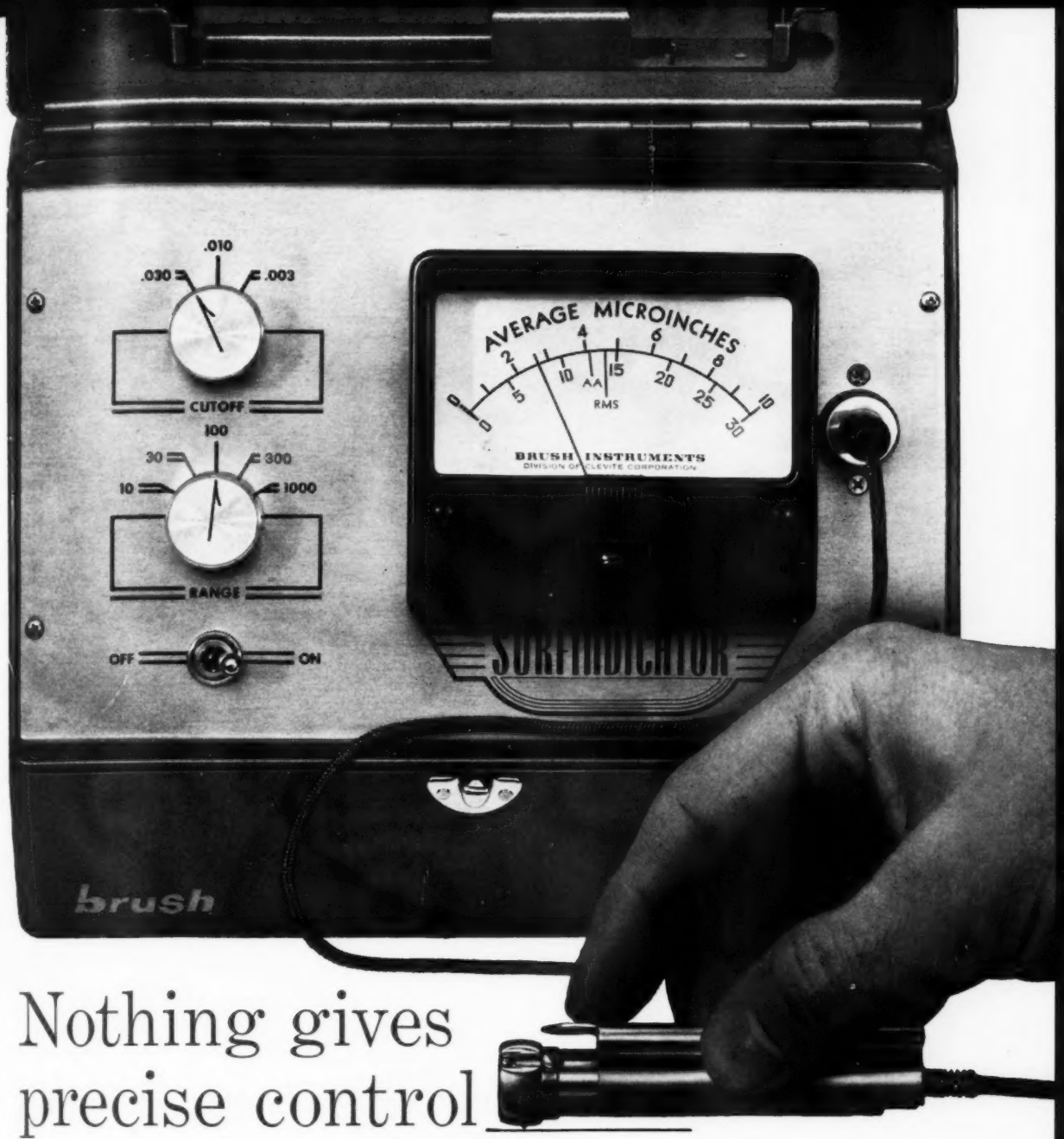

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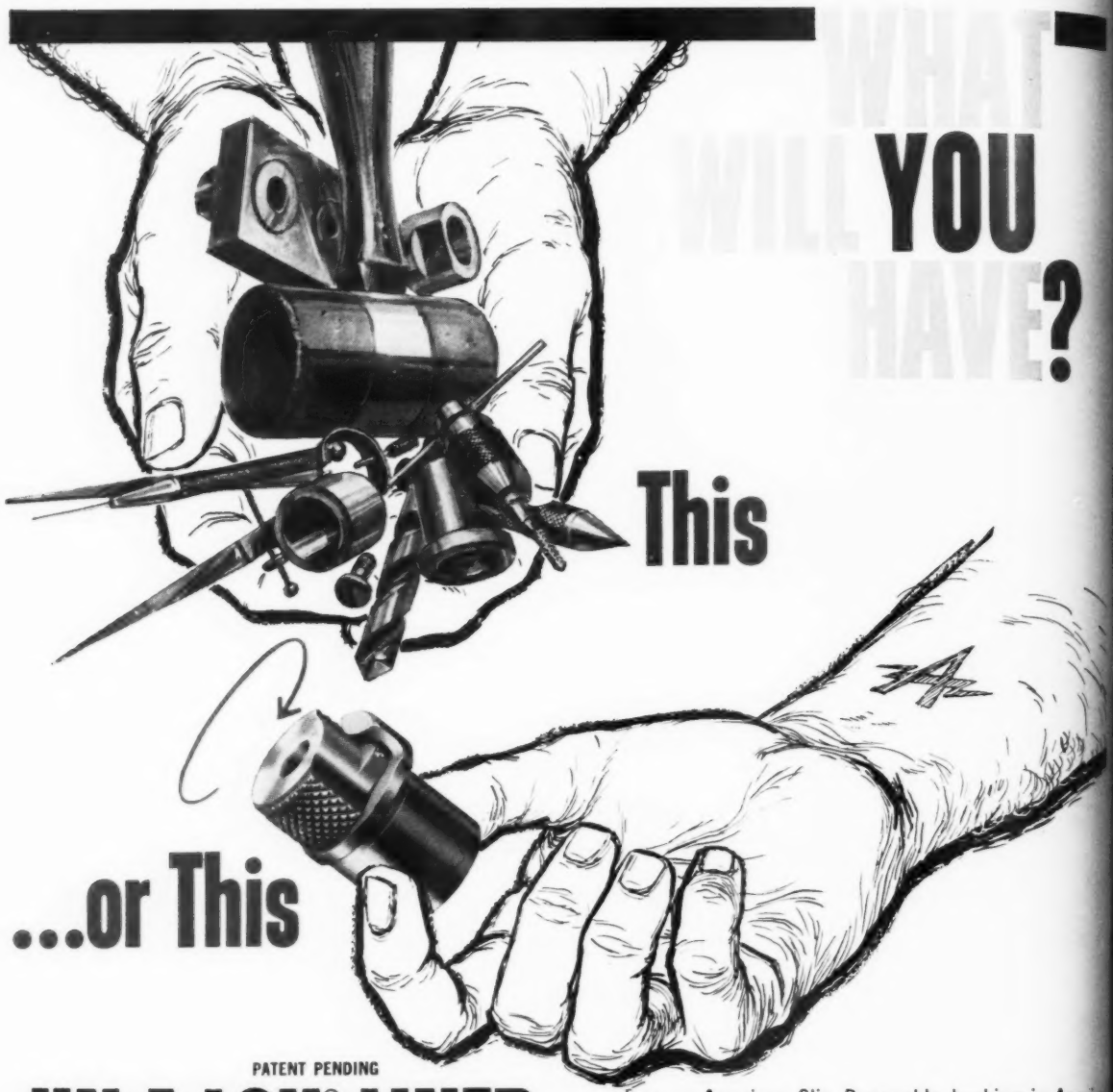

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